DOCUMENT RESUME

ED 235 276 UD 023 126

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TITLE	Junior High School Science.
INSTITUTION	Duval County Schools, Jacksonville, Fla.
PUB DATE	82
NOTE	208p.; A publication of the Division of Instruction.
PUB TYPE	Guides - Classroom Use - Guides (For Teachers) (052)
EDRS PRICE	MF01/PC09 Plus Postage.
DESCRIPTORS	Behavioral Objectives; *Biological Sciences; *Biology; Course Descriptions; *Earth Science; Instructional Materials; Junior High Schools; *Physical Sciences; Resource Materials; Science Activities; *Science Curriculum; Science Education; Science Instruction; *Secondary School Science

ABSTRACT

Science instruction is the topic of this guide developed for the junior high schools of Duval County, Jacksonville, Florida. The subjects covered are (1) Biology I, Advanced, for grades 9-12; (2) Earth/Physical Science, Advanced, for advanced 8th graders; (3) Earth/Physical Science, Advanced (Field Test), for advanced 8th graders; (4) Earth Science for 9th graders; (5) Life Science for 7th graders; (6) Life Science, Advanced, for advanced 7th graders; and (7) Physical Science for 8th graders. For each subject, the following are included: notes to the teacher, course objective and minimum performance objectives, course outline, key to county-adopted intstructional materials, and key to laboratory resources. For 9th-grade Earth Science, some instructional materials (laboratory reports and tests) are also provided. (CMG)

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JUNIOR HIGH SCHOOL
SCIENCE

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1982

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Earth Science 9	ES9
Life Science 7	LS
Life Science 7, Advanced	LS,A
Physical Science 8	PS

CURRICULUM DEVELOPMENT AND MLST STATUS

SECONDARY SCIENCE COURSES

1982-1983

COURSE	GRADE LEVEL	CURRICULUM	MLST
Anatomy and Physiology	SHS	No changes	On line
Biology I	SHS	No changes	On line
Biology I, Adv.	JHS/SHS	Slight revisions	On line
Biology II, Adv.	SHS	New	Field Test
Chemistry I	SHS	No changes	On line
Chemistry I, Adv.	SHS	Slight revisions	On line
Chemistry II, Adv.	SHS	New	Field Test
Earth/Physical Science, Adv.	JHS	New	Field Test*
Earth Science	SHS	No changes	On line
Earth Science 9	JHS	New	Field Test
Ecology	SHS	No changes	On line
Life Science 7	JHS	No changes	On line
Life Science 7, Adv.	JHS	No changes	On line
Marine Biology I	SHS	No changes	On line
Marine Biology II, Adv.	SHS	Major revisions	Field Test
Marine Science	SHS	Slight revisions	On line
Physical Science 8	JHS	Slight revisions	On line
Physical Science II	SHS	No changes	On line
Physics I	SHS	Slight revisions	On line
Physics I, Adv.	SHS	No changes	On line
Physics II B, Adv.	SHS	New	Field Test
Science Survey, Biol.	SHS	No changes	On line
Science Survey, E/S	SHS	No changes	On line
Science Survey, Phys.	SHS	Slight revisions	On line
Zoology	SHS	Slight revisions	On line

* In 10 junior high schools; students in all other schools take on-line MLST.

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INTRODUCTION
BIOLOGY I, ADVANCED

State Accreditator Number. .	1314
Course Code Number	2303
F.T.E. Category.	1.10
Instructional Level.	Advanced

Report Card Abbreviation . .	Biology I, Adv
Length of Course	Year
Credit	1 Science credit
Grade Level.	9, 10, 11, 12

Prerequisites

Department Approval

Textbook(s)

Slesnick, Irwin L., et al, Biology (Glenview, Illinois: Scott, Foresman, 1980).

Notes to Teachers

Biology I, Advanced includes full performance objectives in addition to Minimum Level Skill (MLS) objectives. Students are to develop laboratory skills as well as content knowledge.

The Minimum Level Skills objectives are indicated with an asterisk (*) and will be the only objectives tested on the Minimum Level Skills Test (MLST). The "Teaching Time" listed listed on the "Key to Instructional Materials" is a suggested maximum time for each objective to help insure that all MLS objectives can be met by MLST time.

Laboratory skills are indicated with a plus sign (+). Suggested resources for teaching the laboratory skills have been listed at the end of this section of the teacher's guide. Other resources may be substituted for or added to the suggested laboratory resources. Supplementary materials listed in keys are in order of preferred use.

Changes have been made in the individual research requirement for this course.

In addition to passing the Minimum Level Skills Test, every student in this course is required to complete and present orally, at least one of the following:

A. Extensive library research

B. Laboratory experimentation

C. Extensive field study or observation

The topic to be investigated may be assigned by the teacher or selected by the student, with teacher approval. This requirement will count at least 1/4 of the grade for the third nine-week grading period. It is recommended that progress be evaluated at least once during each grading period in the first semester to insure that students are proceeding and not procrastinating.

Minimum requirements are suggested as follows:

A. A minimum of 50 hours should be spent in library research, in the field, or in the laboratory.

B. Weekly contact should be maintained between teacher and student regarding progress; students may not contact local agency personnel without teacher assistance and approval.

C. If an extensive library research project is undertaken, students will keep note cards and organize them using an outline. An abstract and bibliography, as well as the note cards and outline, are to be turned in at the time of the oral report.

D. If a laboratory or field study project is done, students will keep a log which will include established and approved procedures and data with conclusions. An abstract and bibliography as well as the log are to be turned in at the time of the oral report.

E. The abstract, outline, and bibliography are to be typed, double spaced. Warriner's English Grammar and Composition: Complete Course, Harcourt, 1977, may be used as a reference.

A guide for each requirement follows:

A. Note Cards (Required for Library Research Project)

As information is gathered, it is to be recorded on index cards. No information should be used in the project which is not on a note card. The student should keep three basic guidelines in mind: (1) no more than one main idea should be recorded on one card; (2) the source of the information, including page numbers, must be on the card; and (3) if the information is quoted directly, quotation marks must be used. The note cards can be shuffled and rearranged as the order of the project content is organized.

B. Log (Required for Laboratory or Field Project)

During investigative experimentation or field study, a dated account of all efforts made during the research, experimentation, observation, or field study is to be kept. It should be noted that a field study with a log constitutes more than a collection with classifications. In an experimental log all data should be recorded and a conclusion or conclusions should be included.

C. Bibliography (Required for All Projects)

The working bibliography is a listing, in the proper bibliographic form, of possible sources of information for the project. It is recommended that this product be done on note cards, with each entry on a separate card. It might be helpful to the student to include the location of each source (school media center, Haydon Burns Library, etc.) on each card. A minimum of ten sources is recommended, of which no more than three may be encyclopedias and at least two of which must be non-book sources (periodicals, pamphlets, audio-visual, interview, etc.). If an additional source is found after the working bibliography is submitted, that source should be approved by the teacher. The final bibliography should be submitted on paper, not note cards.

D. Abstract (Required for All Projects)

An abstract is a summary of the student's project. It is 150-200 words in length. It includes brief statements about what was done, how it was done, what was learned, limitations, and applications of the project.

E. Presentation (Required for All Projects)

The results of every student's project must be presented to an advanced class, entered in the school science fair, or other appropriate presentations. The class presentation should be a minimum of ten minutes and accompanied by visual aids (e.g., posters, films, slides, filmstrips, summary sheet, or chalkboard). These visuals should contain charts, diagrams, or graphs.

Students and teachers desiring further involvement in scientific research should use Performance Objective 13.0 as a guide.

BIOLOGY I, ADVANCED

1.0 Research Skills

- 1.1 Scientific Research Method
  - 1.1.1 Control/Experimental elements
  - *1.1.2 Valid conclusions
- 1.2 Data Organization
  - *1.2.1 Assumptions/Observations
  - +1.2.2 Measure: metric length, volume, mass
  - 1.2.3 Construction of data charts
- 1.3 Graph Construction: Bar/Line
- *1.4 Microscope Skills
  - 1.4.1 Microscope parts
  - 1.4.2 Function of microscope parts
  - 1.4.3 Proper care
  - 1.4.4 Faulty image correction

2.0 Basic Biochemistry

- 2.1 Atomic structure
  - 2.1.1 Fundamental particles
  - 2.1.2 Atomic particles
  - *2.1.3 Structure used in bonding
- *2.2 Characteristics of Compounds
  - 2.2.1 Bonded unlike elements
  - 2.2.2 Proportion of elements
  - 2.2.3 Change: chemical properties
- 2.3 Groups of Organic Compounds
  - *2.3.1 Major groups
  - *2.3.2 Element composition
  - *2.3.3 Functions: organic compounds
  - +2.3.4 Examples: foods containing specific organic compounds
- 2.4 Dehydration Synthesis/Hydrolysis
- 2.5 Enzymes
  - +2.5.1 Causes: enzyme activity change
  - 2.5.2 Properties: catalysts, enzymes

3.0 Cell/Cell Environment

- *3.1 Levels of Organization
- 3.2 Life Processes
- 3.3 Cell Theory
- 3.4 Cell Structure
  - *3.4.1 Parts /Organelles
  - *3.4.2 Function: structure, organelles
  - *3.4.3 Differences: plant, animal
  - 3.4.4 Structure vs. function
  - +3.4.5 Cell examination
- 3.5 Homeostasis
- 3.6 Particle Movement
  - 3.6.1 Definitions
  - 3.6.2 Examples
  - *3.6.3 Direction

4.0 Processes in the Cell

- *4.1 ATP/ADP Cycle
- 4.2 Photosynthesis/Respiration
  - *4.2.1 Raw materials/End products
  - *4.2.2 Site of reaction
  - 4.2.3 Organisms

* Indicates Minimum Level Skills
+ Indicates Laboratory Skills

BIOLOGY I, ADVANCED

- 4.3 Photosynthesis
  - +4.3.1 Conditions required
  - 4.3.2 Chlorophyll
  - 4.3.3 Light/Dark reactions
  - *4.3.4 Factors affecting rate
- 4.4 Chemosynthesis
- 4.5 Respiration/Fermentation
  - 4.5.1 Respiration
  - 4.5.2 Fermentation
  - 4.5.3 Comparison
- 4.6 Nucleic Acids
  - 4.6.1 Function
  - 4.6.2 Nucleotide structure
  - 4.6.3 DNA/RNA structure
  - *4.6.4 Complementary strands
  - 4.6.5 Replication
- 4.7 Protein Synthesis
  - 4.7.1 Sequenced
  - 4.7.2 RNA types
  - 4.7.3 Translation of codes

5.0 Reproduction/Genetics

- *5.1 Mitosis
  - 5.1.1 Function
  - 5.1.2 Resulting chromosome condition
- *5.2 Meiosis
- 5.3 Asexual/Sexual Reproduction
  - 5.3.1 Advantages
  - 5.3.2 Comparison of offspring
  - *5.3.3 Examples
- 5.4 Genetic Terms: Genotype/Phenotype/Dominant/Recessive/Homozygous/Heterozygous
- 5.5 Mendel's Laws
- *5.6 Monohybrid Crosses
- *5.7 Dihybrid Crosses
- 5.8 Incomplete Dominance/Multiple Alleles
- 5.9 Sex-Linked Traits
  - *5.9.1 Cross of
  - 5.9.2 Sex determination
  - 5.9.3 Examples
- *5.10 Hereditary Diseases
  - 5.10.1 Examples
  - 5.10.2 Mutation: causes
- 5.11 Natural Selection
  - *5.11.1 Theory
  - 5.11.2 Variation/Adaptation/Competition
- 5.12 Darwin/Lamarck

6.0 Systems: Maintenance/Growth in Organisms

- 6.1 Intake/Exchange of Materials
  - *6.1.1 Unicellular organisms
  - 6.1.2 Plants
  - 6.1.3 Humans
- 6.2 Digestion
  - 6.2.1 Intra/Extra-Cellular
  - 6.2.2 Mechanical
  - *6.2.3 Chemical
  - 6.2.4 Function of organs
- 6.3 Vascular Systems
  - 6.3.1 Need for system
  - *6.3.2 Xylem/Phloem
  - *6.3.3 Transpirational pull
  - *6.3.4 Open/Closed
  - *6.3.5 Human blood vessels
  - 6.3.6 Function of blood structures
  - 6.3.7 Lymphatic system
- 6.4 Waste Removal
  - *6.4.1 Excretion/Secretion
  - 6.4.2 Organs in humans
  - 6.4.3 Nephron

BIOLOGY I, ADVANCED

- 6.5 Gas Exchange
  - *6.5.1 Comparison of structures
  - 6.5.2 Stomates
  - *6.5.3 Humans
- +6.6 Vertebrate Dissection
- 6.7 Support/Protection
  - 6.7.1 Skeletal system: function
  - *6.7.2 Plants
  - *6.7.3 Endoskeleton/Exoskeleton
  - 6.7.4 Human
- 6.8 Locomotion
  - 6.8.1 Mechanisms in protists
  - *6.8.2 Human muscle types
  - 6.8.3 Flexor-extensor pairs
- 6.9 Nervous Systems
  - *6.9.1 Nerve cells
  - 6.9.2 Functions of brain parts
  - 6.9.3 Nerve impulse
  - 6.9.4 Reflex arc
  - +6.9.5 Laboratory observation
- 6.10 Behavior Control
  - 6.10.1 Function of hormones
  - *6.10.2 Plant response
  - *6.10.3 Human endocrine glands
  - *6.10.4 Biofeedback
  - 6.10.5 Innate/Learned behavior

7.0 Classification Systems

- 7.1 Characteristics of Systems
- 7.2 Species
- 7.3 Binomial Nomenclature
- 7.4 Characteristics of Kingdoms
- 7.5 Classification Keys

8.0 Ecological Relationships

- 8.1 Biotic/Abiotic Components of Ecosystem
- 8.2 Cycles
- 8.3 Population Dynamics
- 8.4 Food Webs
- 8.5 Symbiotic Relationships
- 8.6 Human Effects on Environment

9.0 Microorganisms/Disease

- 9.1 Viruses
- 9.2 Bacteria
  - 9.2.1 Beneficial/Harmful effects
  - 9.2.2 Structure
- 9.3 Diseases
  - 9.3.1 Examples
  - 9.3.2 Natural defenses
  - 9.3.3 Immunity

PERFORMANCE OBJECTIVES
BIOLOGY I, ADVANCED

To demonstrate the ability to recall and apply knowledge of research skills, basic biochemistry, the cell and its environment, processes in the cell, reporduction and genetics, systems for maintainence and growth in organisms, classification and taxonomy, ecological relationships, and microorganisms and disease, students will master the performance objectives listed below. Successful completion of this course is based on teacher judgement and the requirement that students pass the Minimum Level Skills Test.

Performance Objectives

1.0 Research Skills

1.1 To demonstrate knowledge of the scientific research method, students will:

(1) suggest the control and experimental elements for a given experiment; and

*(2) draw conclusions when given laboratory data.

1.2 To demonstrate knowledge of data organization, students will:

*(1) identify statements as observations or assumptions;

+(2) measure length, volume, or mass using standard laboratory equipment; and

(3) construct a chart of given laboratory data.

1.3 Students will construct bar graphs and/or line graphs when given laboratory data.

*1.4 To demonstrate knowledge of microscope skills, students will

(1) identify the parts of the microscope on a diagram;

(2) identify the functions of microscope parts;

(3) identify the proper methods of carrying, handling, or cleaning the microscope; and

---

* Indicates Minimum Level Skills
+ Indicates Laboratory Skills

(4) identify the steps to be taken to center an image.

2.0 Basic Biochemistry

2.1 To demonstrate knowledge of atomic structure, students will:

(1) identify the fundamental particles of the atom;

(2) identify the location, charge, or relative mass of the fundamental particles of the atoms; and

*(3) identify the particle of the atom involved in the formation of chemical bonds.

*2.2 To demonstrate knowledge of the characteristics of compounds, students will:

(1) identify that compounds are composed of bonded unlike elements;

(2) identify that elements combine in definite proportion, and

(3) identify that chemical properties of the compounds are changed.

2.3 To demonstrate knowledge of groups of organic compounds, students will:

*(1) identify carbohydrates, fats, and proteins as the mauor groups of organic compounds;

*(2) determine whether a given empirical formula could be a carbohydrate, fat, or protein, based on the types of elements and their ratios;

*(3) identify the functions of carbohydrates, fats, or proteins; and

+(4) determine the presence of starch, reducing sugars, protein, or fat in at least four common foods.

2.4 Students will identify the processes of compound formation and compound degradation as dehydration synthesis and hydrolysis.

2.5 To demonstrate knowledge of enzymes, students will:

+(1) determine the effects of temperature, pH, substrate, or concentration change on the activity of an enzyme; and

(2) identify the properties of catalysts or enzymes.

3.0 The Cell and Its Environment

*3.1 Students will arrange the levels of organization within living organisms from simple to complex.

3.2 Students will identify the life processes necessary for the survival of living organisms.

3.3 Students will identify statements of the Cell Theory.

3.4 To demonstrate knowledge of cell structure, students will:

*(1) identify the major cell parts and organelles as the cell wall, cell membrane, nucleus, cytoplasm, chromosome, ribosomes, mitochondria, chloroplast, lysosome, or vacuole;

*(2) identify the functions of the major cell parts and organelles;

*(3) identify structural differences between plant and animal cells;

(4) predict the function of a specialized cell based on the structure of that cell; and

+(5) prepare a microscope slide of cell tissue in which at least three cell parts are identified.

3.5 Students will identify the importance of maintaining homeostasis within the organism.

3.6 To demonstrate knowledge of particle movement, students will:

(1) identify the definition of permeable, turgid, or flaccid;

(2) identify descriptions of examples as being diffusion, osmosis, active transport, plasmolysis, or cytolysis; and

*(3) predict the direction of particle movement through a membrane with unequal concentrations on either side of the membrane.

4.0 Processes in the Cell

*4.1 Students will identify the location of the high energy bond in the ATP molecule.

4.2 To demonstrate knowledge of photosynthesis and respiration, students will:

*(1) identify the raw material or end products of each;

*(2) identify the sites in a cell of these processes; and

(3) identify in what types of organisms they occur.

4.3 To demonstrate knowledge of photosynthesis, students will:

+(1) determine, in the laboratory, at least one condition necessary for efficient photosynthetic reactions;

(2) identify the pigment which absorbs the light energy;

(3) identify the major events of the light and dark reaction; and

*(4) predict the effect of varying light intensities or light color on the rate of photosynthesis.

4.4 Students will identify an example of chemosynthesis.

4.5 To demonstrate knowledge of respiration and fermentation, students will:

(1) identify the major stages of cellular respiration;

(2) identify an example of each of the two major types of fermentation; and

(3) differentiate between respiration and fermentation in terms of the conditions under which each takes place or the amount of energy provided by each.

4.6 To demonstrate knowledge of nucleic acids, students will:

(1) identify the function of nucleic acids;

(2) identify the three components of a nucleotide;

(3) list three differences between DNA and RNA;

*(4) determine the complementary DNA strand or RNA strand that would be formed by a given DNA strand; and

(5) list, in order, the steps of DNA replication.

4.7 To demonstrate knowledge of protein synthesis, students will:

(1) list, in order, the steps of protein synthesis;

(2) identify the function of messenger RNA or transfer RNA; and

(3) determine the transfer RNA anti-codons or coded amino acids (chart provided) for a given messenger RNA strand.

5.0 Reproduction and Genetics

*5.1 To demonstrate knowledge of mitosis, students will:

(1) identify the function of mitotic cell division in unicellular organisms as reproduction, or in a multicellular organism as growth and repair; and

(2) compare the chromosomes in the daughter nuclei which result from mitosis to the original mother cell.

*5.2 Students will compare the chromosome number in the daughter nuclei which result from meiosis to the chromosome number in the original mother cell.

5.3 To demonstrate knowledge of asexual and sexual reproduction, students will:

(1) determine an advantage of sexual reproduction to survival of a species in a given environmental situation;

(2) compare the offspring to the parents in asexual and sexual reproduction; and

*(3) identify examples of sexual and asexual reproduction.

5.4 Students will identify the definitions of basic genetic terms (genotype, phenotype, dominant, recessive, homozygous, and heterozygous).

5.5 Students will identify basic principles of Mendelian genetics.

*5.6 Students will predict the expected genotype or phenotype ratios of offspring in a simple monohybrid cross when given the dominant and recessive traits and the genotypes of the parents.

*5.7 Students will predict the expected phenotype ratio in a dihybrid cross when given the dominant and recessive traits and the genotypes of the parents.

5.8 Students will predict the expected phenotype ratio of offspring in a cross involving incomplete dominance or multiple alleles.

5.9 To demonstrate knowledge of sex-linked traits, students will:

*(1) predict the expected genotype ratio in a cross involving a sex-linked trait when given the genotype of the parents;

(2) identify the sex chromosome combination which determines a normal human male or a normal female; and

(3) identify examples of sex-linked traits.

*5.10 To demonstrate knowledge of hereditary diseases, students will identify:

(1) sickle-cell anemia, Tay-Sachs, or Down's Syndrome as examples of hereditary diseases; and

(2) radiation, chemicals, or temperature as factors which may cause mutations;

5.11 To demonstrate knowledge of natural selection, students will identify:

*(1) a major concept of the theory of natural selection, and

(2) definitions of variation, adaptation, and competition.

5.12 Students will identify statements as being consistent with the views of Darwin or consistent with the views of Lamarck.

6.0 Systems for Maintenance and Growth in Organisms

6.1 To demonstrate knowledge of the intake and exchange of materials, students will identify:

*(1) diffusion, pinocytosis, or active transport as methods of intake in unicellular organisms;

(2) structures in the plant that take in water; and

(3) villi and alveoli as structures in the human body with increased surface areas for the exchange of materials.

6.2 To demonstrate knowledge of digestion, students will:

(1) differentiate between intracellular and extracellular digestion;

(2) identify the function of mechanical digestion or the structures responsible for mechanical digestion;

*(3) determine whether carbohydrates, fats, or proteins would be chemically broken down in the mouth, stomach, or small intestines; and

(4) match the major parts of the human digestive system with their functions.

6.3 To demonstrate knowledge of vascular systems, students will:

(1) determine whether a given organism would require a transport system, based on the size or body plan of that organism;

*(2) identify the major function of xylem and phloem;

*(3) identify transpirational pull as one of the forces by which water moves up a plant;

*(4) differentiate between open and closed circulatory systems;

*(5) identify the functions or characteristics of arteries, veins, or capillaries in humans;

(6) identify the functions of the red cell, white cell, platelets, and plasma in human blood; and

(7) identify the functions of the human lymphatic system.

6.4 To demonstrate knowledge of waste removal, students will:

*(1) differentiate between excretion and secretion;

(2) match the kidney, skin, lungs, or liver with their excretory functions in humans; and

(3) describe the functioning of the human nephron.

6.5 To demonstrate knowledge of gas exchange, students will:

*(1) identify the organisms using spiracles, lungs, or gills for gas exchange;

(2) identify factors which regulate the opening and closing of stomates in plants; and

*(3) identify the function of alveoli in gas exchange for humans.

+6.6 Students will dissect a frog and locate at least eight structures involved in the intake, distribution, or removal of materials.

6.7 To demonstrate knowledge of support and protection, students will:

(1) identify the major function of a skeletal system.

*(2) identify cellulose or the cell wall as giving support to plants;

*(3) identify survival advantages of endoskeletons or exoskeletons; and

(4) differentiate between bone, cartilage, tendon, and ligament in humans.

6.8 To demonstrate knowledge of locomotion, students will:

(1) identify an example of an organism that moves by means of cilia, flagella, or amoeboid movement;

*(2) identify skeletal (striated), smooth, or cardiac muscle in terms of location or voluntary controls in humans; and

(3) describe the way a flexor-extensor muscle pair operates in moving a joint.

6.9 To demonstrate knowledge of nervous systems, students will:

*(1) identify the function of nerve cells;

(2) identify the functions of the cerebrum, cerebellum, and medulla of the human brain;

(3) describe how a nerve impulse travels;

(4) identify a reflex arc; and

+(5) examine nervous system control of animal behavior or human sense organs in a laboratory investigation.

6.10 To demonstrate knowledge of behavior control, students will:

(1) identify the basic function of hormones as chemical regulators;

*(2) predict the growth response in a stem and root when a plant's position or direction of light source is varied;

*(3) identify the human endocrine glands (pituitary, thyroid, adrenal, ovary, or testes);

*(4) identify biofeedback as the effect one hormone may have on another to maintain homeostasis; and

(5) identify examples of animal behavior as innate or learned.

7.0 Classification and Taxonomy

7.1 Students will identify characteristics of classification systems.

7.2 Students will identify the species as the natural basis for biological classification.

7.3 Students will identify an advantage of binomial nomenclature over common names for organisms.

7.4 Students will identify characteristics of organisms belonging to the Plant, Animal, or Protist Kingdom.

7.5 Students will use a classification key for a given set of objects or organisms.

8.0 Ecological Relationships

8.1 Students will identify examples as being abiotic or biotic components of an ecosystem.

8.2 Students will diagram the carbon, water, or nitrogen cycle.

8.3 Students will predict whether a population would tend to increase or decrease under given circumstances.

8.4 Students will diagram a food web for a given set of organisms.

8.5 Students will identify examples as mutualism, commensalism,

8.6 Students will discuss problems concerning human effects on the environment.

9.0 Microorganisms and Disease

9.1 Students will identify the structure of viruses as being a DNA or RNA core and a protein coat.

9.2 To demonstrate knowledge of bacteria, students will:

(1) list at least two examples of beneficial and harmful relationships between bacteria and humans; and

(2) describe the basic structure of a bacterial cell.

9.3 To demonstrate knowledge of diseases, students will:

(1) identify examples of communicable, nutritional, genetic, or degenerative diseases

(2) identify body mechanisms of defense against disease, and

(3) identify the types of immunity, how they are obtained, the quality of protection afforded, and the duration of protection.

KEY TO RECOMMENDED INSTRUCTIONAL MATERIALS

Performance Objective		Instructional Implications		Resources	
Number	Topic	Teaching Time	Tested on	County Adopted	Supplementary
1.0	Research Skills	1-2 weeks	MLST		J. Otto and A. Towle, Modern Biology (New York: Holt, Rinehart and Winston, 1973), pp. 8-18. ISIS Resource Units (Lexington, Mass.: Ginn and Company, 1977), Unit 2-5, 9-10, 15.
2.0	Basic Biochemistry	3 weeks	MLST	I. Slesnick, et al, Biology (Glenview, Illinois: Scott Foresman, 1980), pp. 91-95, 538-41.	Otto and Towle, pp. 38-55. ISIS Resource Units, Units 12-24.
3.0	The Cell and Its Environment	3 weeks	MLST	Slesnick, pp. 4, 44, 63-90, 102, 580, 588.	Otto and Towle, pp. 58-83. ISIS Resource Units, Units 12-13.
4.0	Processes in the Cell	5 weeks	MLST	Slesnick, pp. 96-101, 107-19.	Otto and Towle, pp. 85-115.

KEY TO RECOMMENDED INSTRUCTIONAL MATERIALS

Performance Objective		Instructional Implications		Resources	
Number	Topic	Teaching Time	Tested on	County Adopted	Supplementary
5.0	Reproduction and Genetics	8 weeks	MLST	Slesnick, pp. 122-30, 139-80, 217-29, 244, 258, 270, 273, 383, 385, 387.	Otto and Towle, pp. 117-216.
6.0	Systems for Maintenance and Growth in Organisms	10 weeks	MLST	Slesnick, pp. 21, 75, 79, 83-90, 315-16, 325-26, 340-46, 414-415, 420, 428, 433, 456, 460-66, 496, 505-91.	Otto and Towle, pp. 281-93, 359-413, 440-508, 523-615, 630-733.
7.0	Classification and Taxonomy			Slesnick, pp. 15-34.	Otto and Towle, pp. 220-28.
8.0	Ecological Relationships			Slesnick, pp. 243, 620-68.	Otto and Towle, pp. 746-823.
9.0	Microorganisms and Disease			Slesnick, pp. 237-53, 566-71.	Otto and Towle, pp. 232-80.

County Adopted Text:

I. Slesnick, et al, Biology (Glenview, Illinois: Scott, Foresman, 1980).

KEY TO LABORATORY RESOURCES

Objective	Skill	County Adopted Text Pages	Other Resources
	Students will:		
+1.2.2	measure length, volume, or mass using standard laboratory equipment.		ISIS Resource Units (Lexington, Mass.: Ginn and Company, 1977), Units 5, 9, 10.
+2.3.4	determine the presence of starch, reducing sugars, protein, or fat in at least four common foods.		A. McCormack, et al, Biology Laboratory Manual (Glenview, Illinois: Scott, Foresman, 1980), pp. 191-94. J. Otto, et al, Biology Investigations (New York: Holt, Rinehart and Winston, 1973), pp. 27-30, 329-31. ISIS, Let's Eat (Lexington, Mass.: Ginn and Company, 1977), Activity 18.
+2.5.1	determine the effects of temperature, pH, substrate, or concentration change on the activity of an enzyme.		McCormack, pp. 201-06. Otto, pp. 333-36. ISIS, Food and Microorganisms (Lexington, Mass.: Ginn and Company, 1977), Activity 15.

KEY TO LABORATORY RESOURCES

Objective	Skill	County Adopted Text Pages	Other Resources
	Students will:		
+3.4.5	prepare a microscope slide of a cell tissue in which at least three cell parts are identified.		McCormack, pp. 21-24. Otto, pp. 5-17, 31-38.
+4.3.1	determine, in the laboratory, at least one condition necessary for efficient photosynthetic reactions.		McCormack, pp. 125-28. Otto, pp. 57-61, 173-75.
+6.6	dissect a frog and locate at least eight structures involved in the intake, distribution, or removal of materials.		McCormack, pp. 167-70. Otto, pp. 283-90.
+6.9.5	examine nervous system control of animal behavior or human sense organs in a laboratory investigation.	528	McCormack, pp. 233-36. Otto, pp. 127-29, 355-68.

EARTH/PHYSICAL SCIENCE

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NOTES TO THE TEACHER

Earth/Physical Science is a course intended for advanced eighth grade students. It is assumed that students taking this course will be enrolled in Advanced Biology I in the ninth grade.

Scope of the Course

Theoretically, these students should be covering three semesters of material in one year. Therefore, the five performance objectives listed for Earth Science and the six performance objectives listed for Physical Science should be covered in this advanced course.

Earth/Physical Science is designed to cover all of the major aspects of both courses within one school year; therefore teachers will need to use time with maximum efficiency.

Reference and Resource Materials

All of the objectives have been keyed to the specific textbook (Matter, Life, and Energy) which is the county adopted reference for this course. Because this course is a combination of two other courses for which Minimum Performance Objectives and Scope and Sequence are written, the reference, resource, and laboratory material have been lifted from those sections.

As a further aid to the teacher, there is a section of additional resource materials at the end of this section.

Outline of Subject Material

Because the course covers such diverse topics, a more complete outline of the subject material for each objective has been included in the scope and sequence.

It is assumed that these students will be taking Advanced Biology I in the ninth grade; therefore extra emphasis is placed on the Matter objective. The students will need to understand bonding and some organic chemistry to master the biology that involves these areas.

The Minimum Level Skills Test

The Minimum Level Skills Test for Earth/Physical Science consists of sixty (60) multiple choice questions. For the student to exhibit mastery of the Earth/Physical Science objectives, seventy-five percent (75%) of these questions must be answered correctly, or forty-five questions.

The majority of the questions on the Minimum Level Skills Test for Earth/Physical Science are written on a Comprehension and Application Level (according to Bloom's Taxonomy of Educational Objectives). This requires the student to be able to interpret, summarize, use abstract ideas, and use principles or theories in problem-solving.

The rest of the questions are defining terms, identifying words, or recognition and recall. These are considered basic knowledge and require a lesser degree of cognitive behavior.

The Minimum Performance Objectives and Scope and Sequence were designed for 30 weeks of instruction and week for review before the Minimum Level Skills Test is administered. The test is scheduled to be given in one forty minute class period.

After the Minimum Level Skills Test

If time allows (which is a shaky assumption to be sure) there are two additional topics that are included in the Course Outline. Astronomy was chosen from the earth science course primarily because of our proximity to the Kennedy Space Center, and the most recent interest in Man and his place and scheme in the cosmos. A unit on heat from the physical science course is included because the county adopted text offers a great deal of information on this topic which is valuable.

One Final Note

The materials in this section represent what is felt to be a workable body of information for the teacher and also that which will be of the greatest value to the student.

Each teacher may not necessarily agree with everything in this section. It is therefore important that each teacher understand the importance of criticizing this product at the end of the school year so that in future writings and revisions, changes can be made which will make this the best possible guide that can be written for Earth/Physical Science students.

EARTH/PHYSICAL SCIENCE

Code #2261
Accreditation #1354

COURSE OBJECTIVE

The student will develop knowledge and skills in Earth/Physical Science so that he will be able to demonstrate mastery of the nine Performance Objectives listed below.

The criterion for successful accomplishment of the Earth/Physical Science Course objective is for the student to answer correctly at least 75% of the items on the Minimum Level Skills Test.

MINIMUM PERFORMANCE OBJECTIVES

1.0 The student will demonstrate knowledge and understanding in the scientific method, use of scientific instruments, and interpretation of tables and graphs by:

- 1.1 identifying a conclusion from an experiment following the scientific method.
- 1.2 **identifying** the metric units which measure length, volume, or mass.
- 1.3 identifying the appropriate use of a meter stick, graduated cylinder, balance, or thermometer.
- 1.4 determining the amount of water in a graduated cylinder from a diagram.
- 1.5 identifying the temperature indicated on a pictured Celsius thermometer.
- 1.6 interpreting a table of data describing the relationship between temperature changes and the months of the year.
- 1.7 interpolating or extrapolating data from a graph.

Criterion for mastery of this objective is to answer correctly 5 out of 7 items on the Minimum Level Skills Test.

2.0 The student will demonstrate knowledge in the structure and changes of matter by:

- 2.1 identifying a definition of matter.

2.2 identifying the atom as the basic building block of matter.

2.3 identifying the charge and location of the electron, proton, or neutron of an atom.

2.4 identifying from a sample block of the Periodic Table, the atomic information - symbol, atomic number, or atomic weight.

2.5 identifying symbols of the more common elements.

2.6 identifying a common element as a metal or non-metal, from a description of the number of electrons in its outer shell.

2.7 relating the distance between atoms to the states of matter.

2.8 classifying examples of changes as physical or chemical changes.

2.9 specifying the number of elements or the number of atoms of each element when given a chemical formula.

2.10 identifying formulas of common compounds - table salt, water, carbon dioxide, or glucose.

2.11 identifying the element which is found in all organic compounds.

2.12 identifying a definition of an ion.

2.13 recognizing the difference between ionic and covalent bonding.

Criterion for mastery of this objective is to answer correctly 10 out of 13 items on the Minimum Level Skills Test.

3.0 The student will demonstrate knowledge of the basic principles related to the characteristics of mechanics by:

3.1 identifying a general definition of a force.

3.2 identifying types of force from examples - gravity, electrostatic, nuclear, or magnetic.

3.3 identifying examples of simple machines - pulley, lever, inclined plane, or wheel and axle.

3.4 calculating the amount of work done in a given situation.

Criterion for mastery of this objective is to answer correctly 3 out of 4 items on the Minimum Level Skills Test.

4.0 The student will demonstrate knowledge of sound and light by:

- 4.1 identifying sound energy as energy produced when matter vibrates.
- 4.2 identifying the speed of light.
- 4.3 identifying the result of passing white light through a prism.
- 4.4 distinguishing between reflection and refraction.
- 4.5 identifying from examples, whether a material is transparent, translucent, or opaque.

Criterion for mastery of this objective is to answer correctly 4 out of 5 items on the Minimum Level Skills Test.

5.0 The student will demonstrate knowledge of the characteristics and production of electricity and magnetism by:

- 5.1 identifying the behavior of positively and negatively charged objects on each other.
- 5.2 identifying a definition of an electric current.
- 5.3 identifying examples of materials which are good conductors of electricity - metals or graphite.
- 5.4 identifying a property of a magnet.

Criterion for mastery of this objective is to answer correctly 3 out of 4 items on the Minimum Level Skills Test.

6.0 The student will demonstrate knowledge and understanding of factors affecting weather by:

- 6.1 identifying humidity as referring to the amount of moisture in the air.
- 6.2 identifying examples of precipitation.
- 6.3 identifying a hurricane from a description.

6.4 identifying the type of weather usually associated with a high pressure area.

Criterion for mastery of this objective is to answer correctly 3 out of 4 items on the Minimum Level Skills Test.

7.0 The student will demonstrate knowledge and understanding of the water resources of the earth by:

7.1 identifying the main parts of the water cycle as evaporation, condensation, precipitation.

7.2 recognizing that salt water intrusion is caused by excessive removal of water from the aquifer.

7.3 identifying polluted water as water containing contaminants.

7.4 identifying the most common mineral or chemical compound in sea water.

7.5 recognizing the causes of the earth's tides.

7.6 identifying the major cause of surface ocean currents and waves.

7.7 identifying two sea floor features from a diagram - continental shelf, continental slope, trench, basin, or ridge.

Criterion for mastery of this objective is to answer correctly 6 out of 8 items on the Minimum Level Skills Test.

8.0 The student will demonstrate knowledge and understanding of the basic principles of the study of geology by:

8.1 identifying the terms lithosphere, hydrosphere, and atmosphere as a way earth scientists divide the earth.

8.2 recognizing the layers of the solid part of the earth from a diagram - core, mantle, and crust.

8.3 identifying faulting or folding as movements of the earth's crust.

8.4 distinguishing between the terms, lava and magma.

8.5 identifying the three classes of rocks according to their origin.

8.6 identifying the wind as the agent by which sand dunes are formed.

8.7 identifying the most probable type of erosion at work in the formation of a given landform feature - wind, water, gravity, or a combination of these.

8.8 recognizing that Florida has at different times in its history been under shallow seas and above sea level.

Criterion for mastery of this objective is to answer correctly 6 out of 8 items in the Minimum Level Skills Test.

9.0 The student will demonstrate knowledge of energy conservation by:

9.1 identifying the primary source of energy for the earth.

9.2 identifying from a description, the major sources of energy as solar, geothermal, nuclear, wind and water, or fossil fuel.

9.3 identifying an advantage of solar or nuclear energy.

9.4 identifying a disadvantage of solar or nuclear energy.

9.5 recognizing that the United States uses more fossil fuel than it produces.

9.6 identifying overall reasons for the anticipated energy problem as waste, standards of living, or attitudes relating to available energy supplies.

9.7 recognizing an individual action that would conserve energy.

Criterion for mastery of this objective is to answer correctly 5 out of 7 items on the Minimum Level Skills Test.

EARTH/PHYSICAL SCIENCE

COURSE OUTLINE

1.0 SCIENTIFIC METHOD, INSTRUMENTS, AND GRAPHING

- The Scientific Method
  - Problem: stated in the form of a question
  - Hypothesis: an educated guess as to the solution of question
  - Procedure: describe how the experiment will be run
    - list equipment to be used
    - list variables
      - independent
      - dependent
      - constants
      - control
  - Gather data: experiment is run
  - Record data: while running the experiment, record all data on data tables, graphs, and charts
  - Conclusion: must answer the question stated in the provlem
- Identification of the basic units of the metric system and what each measures
  - meter, centimeter
  - liter, milliliter
  - kilogram, gram
  - second
- Basic English-metric equivalents
- Definition of density and temperature
- Identification and use of laboratory equipment
  - meter stick
  - graduated cylinder
  - balance
  - thermometer
- Graphing Data
  - Types of graphs
    - bar graphs
    - line graphs
    - pie graphs

2.0 MATTER

- Definition of Matter
- Atom as the basic building block of matter
- Distinguish between mass and weight
- Theories and atomic models of Dalton and Bohr
- Identification of the parts of an atom, their location and charge
- Use the Periodic Table with regard to:

    - atomic number
    - atomic weight
    - chemical symbols
    - columns
    - rows
    - metals
    - non-metals
    - valence
- Properties of metals and non-metals
- Identification of common examples of metals and non-metals (carbon, hydrogen, oxygen, nitrogen, copper, iron, aluminum)
- Distinguish between chemical and physical properties
- Distinguish between chemical and physical change and how to identify each
- Three states of matter and common examples of each state
- Characteristics of the three states of matter
- Determine the number of elements and the number of atoms of each element when given a chemical formula
- Definition - element, compound, mixture, solution
- Identification of the symbols and formulas of:
    - elements - carbon, hydrogen, oxygen, nitrogen, copper, iron, aluminum
    - compounds - table salt, water, carbon dioxide, glucose
- Identification of the reactants and products in a chemical equation
- Definition of an ion
- Chemical bonding
    - ionic
    - covalent
- Balancing chemical equations
- Conservation of mass
- Properties of acids, bases, and salts
- Identification of a description of nuclear energy and the types of radiation - alpha, beta, gamma
- Fusion and fusion reactions
- Identify carbon as the most common element found in all organic compounds

3.0 MECHANICS

- Definition of force
- Types of force - gravity, electrostatic, friction, nuclear, magnetic
- Newton's laws of motion
- Definitions of speed, velocity, and acceleration
- Vectors and vector quantities
- Momentum
- Kinetic and potential energy
- Work
    - formula for determining work (W = F X D)
    - unit for measurement

- Power
- Identification of the types of simple machines (lever, pulley, inclined plane, and wheel and axle)
  - mechanical advantage
  - efficiency
  - function

4.0 SOUND AND LIGHT

- Define sound and how it is produced - vibrations of matter
- Distinguish between transverse and compressional waves
- Identify the components of a wave from diagram
- Define:
  - wavelength
  - amplitude
  - frequency
  - crest
  - trough
- Distinguish between noise and music
- Distinguish between constructive and destructive interference
- Doppler effect
- Electromagnetic spectrum - characteristics
- Define light with regard to its speed (186,000 miles per second - 3.0×10^8 meters per second) and place in the electromagnetic spectrum
- Distinguish between reflection and refraction
- Identify the effects of light transmission in material Which is:
  - opague
  - translucent
  - transparent
- Examples of materials which are opaque, translucent, and transparent
- Define a mirror and recognize the difference between a plane, concave and convex mirror
- Define a lens and recognize the difference between a concave and convex lens and a prism
- Identify the relationship between color vision and the reflective-absorptive properties of matter

5.0 ELECTRICITY AND MAGNETISM

- Distinguish between static and current electricity
  - behavior of positive and negative charges -
    - like repel, unlike attract
  - detection of charged and neutral objects
    - with an electroscope
  - charging by conduction, induction
- Define electric current - flow of electrons
- Identify the basic parts of an electric circuit

- Define and give examples of conductors and insulators-metals, rubber, etc.
- Distinguish between series and parallel circuits
- Define Ohm's Law with regard to an amp, volt and ohm
- Calculations using Ohms Law
- Describe magnetism with regard to:
    - Properties of magnets - like poles repel, unlike poles attract
    - lines of force indicate magnetic field
    - types of magnets
    - magnetic materials
- Methods of producing electricity

6.0 METEOROLOGY

- The Nature of the atmosphere
    - What the atmosphere is made of
        - The air is a mixture of molecules of several gases near the earth's surface the air contains
            - 78% nitrogen
            - 21% oxygen
            - 1% others including: mainly argon, some carbon dioxide, neon, helium, hydrogen, methane, water vapor, and small solid particles
        - nitrogen
            - most abundant element in the air
            - not very active chemically
        - oxygen
            - This is the gas that combines with food in most living things to produce energy
            - combines with iron to produce rust
            - is necessary for burning to take place
    - Poisons in the air
        - The wastes of man and his civilization are the main causes of pollution.
        - Each year about 200 million tons of pollutants are poured into the air.
        - 60% of the air pollution in the United States comes from automobiles and other machines used for transportation.
        - Water Cycle
            - precipitation
            - evaporation
            - condensation
    - Pressure, Density, and Height of the Atmosphere
        - How heavy is the air?
            - At sea level the average pressure of air is 14.7 pounds per square inch.
            - air pressure depends on:
                - density of the air
                - how high the air extends above the surface of the earth
    - Pressure Decreases with Height
    - The layers of the Atmosphere
        - Troposphere-the zone of weather changes

- extends upward from the earth's surface to about 5 miles at the poles and about 10 miles at the equator
- Air temperature decreases at a steady rate of 1 F. for every 300 feet of height gained.

Stratosphere-calm air storms are unknown

- extends from the top of the troposphere to a distance of approximately 50 miles above the surface
- jet stream is found at this level-speeds may reach 300 miles per hour
- ozone layer-controls the amount of ultraviolet light that reaches the surface of the earth. Too much ultroviolet light would probably destroy all living things.

Ionosphere

- extends from an altitude of approximately 50 miles to 300 miles
- contains charged electrical particles called ions
- Shortwave radio signals can be bounced off this layer, thus increasing the distance these radio signals can be transmitted and received.
- also protects us from many of the sun's harmful radiations

Exosphere-"outside layer"

- This is the area above 300 miles extending outward until it becomes a part of outer space

Heating the Atmosphere-Almost all of the earth's heat comes from the sun. This is called incoming solar radiation or insolation for short.

- temperature inversion-a situation in which the air above the surface is warmer than the lower layer of air or the surface itself. This situation can result in pollutants not being allowed to escape from the surface

How Heat Travels

- radiation-transfer of heat and other forms of energy through space
- conduction-heat is transferred from one place to another through some solid substance
- convection-the movement of hot material through a gas or a liquid (fluid)
- convection currents-the circular motion set forth in a fluid when warm material rises and cooler material sinks due to the difference in the density of the materials

- Air pressure
  - Causes of differences
    - warm air rises - cool air falls
    - air masses - moist air weighs less than dry air
  - Measuring air pressure
    - aneroid barometer
    - mercury barometer
  - Local winds
    - sea breezes
    - land breezes
    - mountain and valley breezes
- Moisture
  - evaporation - the change of a liquid into a gas or vapor
  - Energy for evaporation is supplied by the sun or it is taken from nearby objects.
  - several factors determine speed of evaporation
    - high temperature
    - dry air
    - wind
    - low air pressure
  - air that contains all of the water that it can hold is said to be saturated
  - Measuring the amount of water in the air
    - Absolute humidity-the actual amount of water in the air. This is not a very useful measure because it does not tell the degree of saturation.
    - relative humidity-defined as the amount of moisture the air holds compared to the amount that it could hold at that temperature usually given as a percent
    - condensation-when vapor changes into a liquid
    - hygrometer-Instrument used to measure relative humidity
- Air Masses and Thunderstorms
  - Types of Air Masses
    - continental-polar - dry and cold
    - maritime-polar - wet and cold
    - continental-tropical - dry and warm
    - maritime-tropical - wet and warm
  - Types of Fronts-the edges of air masses
    - warm front
    - occluded front
    - cold front
    - stationary front
- Whirlpools of Air
  - cyclone or low - a center of low pressure
    - Air near a cyclone will move toward the lowest area.
    - In the Northern Himisphere the air around a cyclone moves in a counterclockwise direction.
    - South of the equator, the winds will blow in a clockwise direction in a cyclone.
  - anticyclone or high
    - Air near an anticyclone will always move away from the high pressure center.

    - In the Northern Hemisphere the winds coming out of an anticyclone area will travel in a clockwise direction.
    - South of the equator the winds will be reversed and usually produce periods of clear weather.
- Thunderstorms
  - two types of thunderstorms
    - type one occurs in late spring or summer - caused by locally heated air surrounded by cooler air
    - type two occurs when a cold air mass is being forced under warm moist air - sometimes occur over a line extending for several hundred miles - these lines of thunderstorms are called *squall lines*
- Types of Clouds
  - Stratus clouds
    - stratus - "spread out" - layer of clouds
  - Cumulus clouds
    - cumulus - "piles-up" - light, fluffy fair weather cloud
  - Cirrus clouds
    - cirrus - "feathery" or "wispy" - high clouds made of ice crystals
- Precipitation - any of the forms in which water may return to the surface to the earth
  - *rain*-forms as the droplets of water vapor join together in clouds which are not sufficiently cold to freeze the water drops
  - *snow*-forms under conditions where the water vapor freezes directly, without condensation, forming crystals
  - *sleet*-forms when conditions are such that the snow crystal may melt and then enter an area of cold air again. In this instance it refreezes not as a crystal but rather as an ice particle
  - *hail*-forms under conditions where the rain drops freeze but are carried up by updrafts. These then begin to fall but are repeatedly caught up and carried to areas of freezing temperatures, each time having more and more water added until the weight becomes too great and hailstone falls to earth
- Hurricanes and Tornadoes
  - Hurricanes
    - more general name for a hurricane is *tropical cyclone*
    - generally between 50 and 700 miles in diameter
    - winds of at least 75 miles per hour
    - *eye*-central part of the hurricane fairly calm-about 15 miles in diameter
    - common in late summer and early fall
    - generally starts moving in a westerly direction, but the direction bends toward the right because of the rotation of the earth
    - A hurricane in the Pacific Ocean is called a *typhoon*.

A hurricane in the Indian Ocean is called a cyclone.
Tornadoes
smallest and most vicious of all storms
usually travel between 20 and 30 miles per hour
Winds in the tornado may reach 500 or more miles per hour.
waterspout-the funnel of a tornado over water

7.0 OCEANOGRAPHY

Ocean Water
The Composition of Ocean Water
Scientists estimate the oceans contain 50 million billion tons of minerals in solution.
Salt-sodium chloride is the most common chemical compound (makes up 2/3 of the total mineral content).
magnesium chloride-a light weight mineral used in the manufacture of airplanes, missles, and electronic equipment
Many gases are also dissolved in sea water:
oxygen
nitrogen
carbon dioxide
Many factors affect the concentration of sea water
Gases are more soluble in cold water than in warm water.
Solid minerals are more soluable in warm water than in cold.
In areas of high evaporation, the concentrations are higher because
water is evaporated, and
remains of plants and animals will remain near the bottom until currents circulate them upward.
The Edges of the Oceans
The Continental Shelf
continental shelves-the part of the continental edge that is covered by the oceans
There is a gradual slope of about 5 feet per mile along the continental shelf.
The Continental Slope
continental slope-marks the area where the steep drop-off into the ocean floor begins
gradient averages about one foot in twenty-five but may be as great as one foot in six
Exploring the Depths
Echo Sounders
Sound travels at a rate of one mile per second in water.
Bathysphere-took man to a depth of over 3,000 feet
Bathyscaphe-able to take men to depths of up to 35,800 feet

- Features of the Ocean Depths
  - Trenches-generally about 35,000 feet deep--appear to be associated with volcanic and earthquake activity
  - Midocean Ridges-runs continuously for over 40,000 miles
  - Seamounts and Guyots
    - seamounts-mountains in the sea standing as high as 3,000 feet above the sea floor
    - guyots-found in the Pacific and Indian Oceans-like seamounts but the tops are flat-tops are from 3,000 to 6,000 feet above the sea floor
- Movement of the Ocean: Waves and Tides
  - Waves
    - A single particle of water within a wave moves up and over then down and under as the wave passes by, returning to almost the same position from which it started.
    - As a wave approaches a shoreline, its direction and speed change, the speed of the bottom of the wave is reduced, and the top of the wave "breaks," falling forward onto the beach
  - Tides-caused by gravitational pull of the moon and sun
    - spring tide-sun and moon are pulling at the same place at the same time
    - neap tide-sun is pulling at right angle to the pull of the moon-tides are not as great
- Movement of the Ocean: Currents
  - Because of the rotation of the earth, anything that is moving in a direction toward a pole will seem to bend. This is known as the Coriolis effect.
  - In the Northern Hemisphere this bending is to the right, and in the Southern Hemisphere it is to the left.
- The Shorelines
  - Erosion-the effectiveness of wave erosion depends on
    - force of the waves,
    - tools available,
    - shape of the shoreline, and
    - kinds and conditions of the rocks along the shore.
  - Structures Along the Shore
    - sea cliff-a nearly vertical wall caused by waves along a coast that has neither risen nor fallen recently
    - terrace-flat area below the cliff
    - coves and headlands-As a shoreline is driven back by the waves, differences in the hardness of rocks cause the outline of the shore to be more and more irregular, causing coves and headlands.
    - stacks-small patches of harder or better protected rock left after shore erosion

- Marine Deposits
    - beach-mass of drifting material exposed at low tide-area of land between high and low water marks
    - bar-a more permanent deposit of drift material along a beach
    - spit-thin finger of sand extending into the sea
    - bay bars-spits which occur at the mouth of a bay
    - offshore bars-islands which have developed as a result of bar materials building up to the point of having dry sand and dunes
- The Wealth of the Ocean
  - Minerals from the Sea
    - sodium chloride-Table salt-is by far the most common mineral in the oceans.
    - Many other minerals are mined from the oceans-
      - magnesium,
      - diamonds,
      - sulfur,
      - iron.
    - nodules-small black ball-like objects found in the ocean which contains manganese and iron, with small amounts of nickel and cobalt
  - Food
    - 90% of the sun's energy that reaches the earth is trapped by the oceans of the world through microscopic plants called algae
    - mariculture-farming the oceans
  - Energy
    - use of waves and tides as a source of energy to generate electricity
    - use of temperature differences between surface and deep water as a source of energy to produce electricity

8.0 GEOLOGY

- The Earth From Space
  - The Earth seen from the moon
    - atmosphere - air that surrounds the planet (ball of air)
    - hydrosphere - liquid part of the earth's surface (ball of water)
    - lithosphere - solid part of the earth, rock and soil (ball of rock-containing parts)
  - Weightlessness and other effects
    - gravity - the force that attracts objects toward the center of the earth
    - weight - the force with which a body is attracted toward a celestral body
    - mass - a measurement of the amount of matter an object contains
- The shape of the Earth
    - circumference - 24,902 miles

    - diameter at the equator is approximately 7,930 miles
    - distance through the earth from pole to pole is 27 miles less than the distance at the equator
- Maps as Models - A globe is a model that represents the earth.
  - Parallels of Latitude - imaginary lines running parallel to the equator around the earth
  - Lines of Longitude - imaginary lines running through the poles. These begin with the prime meridian which runs through Greenwich, England and marked 0° longitude
- Types of Maps
  - Mercator projection map - type of map drawn as a sheet of paper rolled into a cylinder around the globe
  - Conic projection map - used primarily for small area maps
  - Topographic maps show both elevation and height of the area covered by the map
    - Contour lines
    - Depressions
- Structures and Forces in the Earth
  - Crust, mantle and core of the earth
    - The crust
    - The mantle
    - The core
  - Crustal changes
    - Folding-wrinkle in the layers of the earth's crust
    - Faulting-cracks in the layers of the earth's crust
  - Earthquakes
    - Caused by faulting
    - Detected by shock waves - seismograph is one instrument used
  - Volcanoes
    - Definition
    - Types of eruptions-quiet and explosive
  - Class of rocks
    - Igneous-"fire" rocks, produced by heat and pressure
    - Metamorphic-produced by pressure
    - Sedimentary-produced by effects of weathering and erosion
- Wearing Away of the Earth's Crust
  - Weathering
    - Mechanical-changed in shape, size
    - Chemical-changed from one substance into new substance
  - Erosion
    - Landslides
    - Wind
    - Running water

- Build-up of the Earth's Crust
    - Wind deposits
    - Sand deposits
        - Dunes
        - Loess
    - Water deposits
        - Stratification
        - Sediments in strata
        - Deltas
    - Mountains
        - Types of mountains
- Florida Geology - "Florida Emerges" (see supplement)
    - History of land formation
        - submerged and uplifted
        - origin of limestone
        - sinkholes and caves
    - Mineral resources
        - phosphate
        - limestone

9.0 ENERGY CONSERVATION

- Definition of Energy
- Primary source of energy - the sun and its nuclear reactions
- Available, important sources for mankind - solar, geothermal, nuclear, wind and water, fossil fuels
- Definitions of each source with examples
- Advantages and disadvantages of each source
- Useful products of the sources - heat, light, motion, current electricity
- Factors leading to the energy problem
    - fossil fuel - nonrenewable, world demand increasing, domestic demand far exceeds domestic supply
    - consumer's lack of knowledge
    - waste - by individuals, built in obsolescence
    - standards of living
    - attitudes
- Most promising alternatives to fossil fuel for Florida - solar, nuclear
- Major government agencies attempting to deal with energy problem
    - International Energy Agency (international)
    - Department of Energy (national)
    - Environmental Protection Agency (national)
    - State Energy Office (state)
    - JEA Energy Office (local)
- Responsibilities of these agencies
- Other actions taken by the government
- Opportunity cost - something we give up in order to gain something else
- Energy conservation measures that individuals may take
    - benefits and opportunity costs of these measures
- Reasons energy is becoming so expensive
- A need for balance
    - energy needs - environmental protection - the economy

SUGGESTED TOPICS TO BE COVERED AFTER THE MINIMUM LEVEL SKILLS TEST

HEAT

- Definition of heat
- Distinguish between heat and temperature
- Heat transfer
  - Conduction
  - Convection
  - Radiation
- Measurement of heat
- Molecular kinetic theory - solids, liquids, gases
- Uses of heat
  - Heating systems
  - Refrigeration
  - Heat engines
- Gas laws
- Thermal pollution

ASTRONOMY

- The Sun
  - The Face of the Sun
    - photosphere - the ball of light
    - chromosphere - the ball of color
    - solar prominences - the flame-like clouds of gas extending millions of miles into space
    - corona - the "crown" seen only during an eclipse
    - sunspots - dark spots of relatively cooler temperature
    - sun spot cycle - follow an 11 year cycle; believed to affect our weather
    - solar flares - bright spots that usually occur near sunspots - believed to be caused by gases being erupted with great force from the sun's surface
  - The Source of the Sun's Energy - fusion of hydrogen into helium (nuclear reaction)
- The Moon - The Earth's Nearest Neighbor
  - Motions of the Moon
    - revolves around the earth in about 27 1/3 days
    - perigee - point at which it is closest to earth
    - apogee - point at which it is farthest from earth
    - phases - (new moon, crescent, 1st 1/4, gibbous, full, 3rd 1/4)
    - solar eclipse - moon comes between earth and sun
    - lunar eclipse - earth between the sun and the moon
    - total solar eclipse - cone of the shadow reaches and covers an area a few miles across
    - annular eclipse - cone of the shadow does not reach earth

- The Inner Planets (terrestrial-earth like)
  - Mercury
    - planet's name means "wanderer"
    - smallest and fastest
    - not easily seen on earth because it is close to the sun
  - Venus
    - thick clouds cover the surface at all times
    - known as the "morning" or "evening" star
  - Earth
  - Mars
    - has two moons
    - has ice caps
    - the "red" planet
    - has apparent seasons
- The Outer Planets (Jovian-giant gaseous planets)
  - Jupiter
    - has 13 known moons
    - largest planet in our system
    - has a magnetic field and radiation belts
    - "red spot"
    - has cloud belts
  - Saturn
    - 10 known moons
    - rings - assumed to be composed of minute dust and ice particles
  - Uranus
    - 5 known moons
    - similar to Saturn in structure
    - latest evidence shows it has rings similar to Saturn
  - Neptune - similar to other Jovian planets
  - Pluto - may be an escaped moon of Neptune - probably always dark and is a frozen rock type, possesses one known moon
  - Planet X - Due to the excess variations in the orbits of Uranus and Neptune, another as yet undiscovered planet is suspected by some astronomers.
- Other Heavenly Bodies
  - Comets
    - Most cannot be seen with the naked eye.
    - actual composition is unknown; thought to be frozen ice, dust, and gases
    - Halley's comet - returns about every 76 years; has done so since at least 1531 A.D.
  - Meteors - (shooting stars)
    - meteor - bright streak in the sky
    - meteorite - when the meteor strikes the earth
    - meteoroid - particles in space that have not reached the earth's atmosphere
  - Asteroids - between Mars and Jupiter, could be remnants of blown up planet

- Origin of the Solar System
  - Two-star Theories
    - tidal theory - A star passed very close to our sun.
    - explosion theory - A second star near ours exploded.
  - Condensing - Cloud Theories
    - Nebular theory - Planets formed as a rotating mass began to form planets from the bands of material.
    - Eddy Theory - here again a rotating mass of material but it is proposed that eddies formed around the central mass and these became the planets
- Stars
  - constellations - patterns of stars
  - apparent magnitude - brightness as seen from the earth
  - absolute magnitude - real brightness
  - H-R diagram
  - Novas/Super novas - remains of exploded stars
  - Double Stars - binary stars, revolve around each other
- Origin of the Universe
  - Theories of Cosmogony
    - branch of astronomy which deals with the origin and development of the universe and its parts
      - pulsating-universe theory - universe alternates between growing larger and getting smaller
      - expanding-universe theory - always growing larger
  - The Three Theories
    - big-bang theory - Matter in the universe was originally all concentrated together (mass about 8 times the size of our sun). An explosion caused all this matter to spread throughout the universe as galaxies and other materials.
    - Oscillating-universe theory - based on idea of the pulsating universe idea
    - steady-state theory - New material is constantly being formed and is moving outward.
  - Other Phenomena
    - pulsars - believed to be rotating, extremely dense - thought to be very old stars
    - black holes - objects so dense, light and other energy cannot escape
    - quasars - starlike radio-emitting-moving away from us at very high rate of speed

KEY TO COUNTY ADOPTED INSTRUCTIONAL MATERIALS FOR EARTH/PHYSICAL SCIENCE

TERMINAL PERFORMANCE OBJECTIVES		WEEKS	NUMBER OF ITEMS ON THE MLS TEST	MATTER, LIFE AND ENERGY, Herron, et al. Rand McNally and Co. 1972	EARTH SCIENCE: A SEARCH FOR UNDERSTANDING, Brown, et al. J. B. Lippincott Co. 1973	FOCUS ON PHYSICAL SCIENCE Heimler & Price C. E. Merrill Co. 1974
NUMBER	TOPIC					
1.0	Scientific Method, Instruments, and Graphing	1	7	11-20, 27-35	None	4-21
2.0	Matter	8	13	20-24, 41 and 42 47-97	None	24-32, 40-52, 60-70, 128-151, 176-186, 200-209, 421-428, 445-451
3.0	Mechanics	3	4	133-164	None	220-237, 244-257, 264-284 293-294
4.0	Sound and Light	3	5	201-253	None	331-346, 352-367
5.0	Electricity and Magnetism	3	4	257-298	None	374-393
6.0	Meteorology	3	4	339-352	477-518	None
7.0	Oceanography	3	8	362-386	293-339	None
8.0	Geology	4	8	395-412, 420-429	150-291	None
9.0	Energy Conservation	2	7	None	None	292-310

KEY TO COUNTY ADOPTED INSTRUCTIONAL MATERIALS FOR EARTH/PHYSICAL SCIENCE (Continued)

TERMINAL PERFORMANCE OBJECTIVE	PATHWAYS IN SCIENCE Oxenhorn, Globe Book Co. 1975			ISIS RESOURCE UNITS Ginn and Co., 1977	"UNIVERSE AND I" Film Series Kent. Educational Television
	EARTH SERIES	CHEMISTRY SERIES	PHYSICS SERIES		
1.0	None	None	None	Units 2, 4, 9, and 14	None
2.0	None	Book #1 4-85, 102-109, 117-120, 141-176 Book #2 3-5, 96-105 Book #3 1-9, 26-60, 80-94	None	Units 18, 22, and 24	"Halftime"
3.0	None	None	Book #2 41-114	Unit 18	"Vectoria", "Luna the Lovely", "Gravity Drag", "Bulletin"
4.0	None	None	Book #3 1-33, 47-60, 87-101, 111-153	None	"A Visit to Spectrum II"
5.0	None	None	Book #1 5-48, 60-84, 90-110	None	None
6.0	Book #2 55-66, 94-117	None	None	None	"Incident on Cannon Mt." "Freezing Point"
7.0	Book #2 126-148 Book #3 101-105	None	None	None	"Sea Search" "The Atlantis Connection"
8.0	Book #1 71-118	None	None	None	"Ballad of Ramblin Willy" "Interior Motive"
9.0	None	None	Book #2 21-40 Book #3 4-10	Unit 18	"Jake's Gate" "The Future"

SUGGESTED LABORATORY INVESTIGATIONS FOR EARTH/PHYSICAL SCIENCE

TERMINAL PERFORMANCE OBJECTIVES		WEEKS	LABORATORY INVESTIGATIONS for MATTER, LIFE AND ENERGY, Joslin, Rand McNally and Co. 1972	PHYSICAL SCIENCE: A LEARNING STRATEGY FOR THE LABORATORY, Merrill, 1974	ACTIVITY CENTERED PROGRAM (Teacher's Guide) for FOCUS ON PHYSICAL SCIENCE, Merrill, 1977
NUMBER	TOPIC				
1.0	Scientific Method Instruments, and Graphing	1	Investigations - 1, 2, 18	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 19, 20, 21	4-8, 42-50
2.0	Matter	8	Investigations - 5, 6, 7, 9	23, 25, 26, 29, 33, 34, 35, 36, 37, 38, 39, 49, 50, 58, 64, 65, 66, 67, 68, 69, 72	52-54, 57-62, 78-79, 85-91, 111-116, 130-133, 141-149
3.0	Mechanics	3	Investigations - 14, 15, 16, 17	12, 13, 14, 15, 16, 17, 18, 19, 40, 41, 42, 43, 44, 45	10-32
4.0	Sound and Light	3	Investigations - 22, 23, 24, 25, 26, 27	49, 50	176-204
5.0	Electricity and Magnetism	3	Investigations - 28, 29, 30, 32	51, 52, 53, 54, 55, 56	209-232, 236-241
6.0	Meteorology	3	Investigations - 38 and 39	None	None
7.0	Oceanography	3	Investigation - 42	None	None
8.0	Geology	4	Investigations - 45, 46, 47	None	None
9.0	Energy Conservation	2	None	None	None

SUGGESTED LABORATORY INVESTIGATIONS FOR EARTH/PHYSICAL SCIENCE (Continued)

TERMINAL PERFORMANCE OBJECTIVE	PATHWAYS IN SCIENCE Laboratory Workbooks, Oxenhorn et al., Globe Books Co. 1971			EARTH AND SPACE SCIENCE SKILLCARDS, Merrill, 1968	PHYSICAL SCIENCE SKILLCARDS, Merrill Publications Company 1968
	EARTH	CHEMISTRY	PHYSICS		
1.0	Book #2 - Problem 1	Book #1 - Problem 1 Book #2 - Problem 1	Book #2 - Problem 1	None	#1, 12, 44, 48, and 49
2.0	None	Book #1 - Problems 1, 4, 5, and 8 Book #3 - Problems 1, 4, 5, and 7	None	None	#38, 39, 41, 49, 50, 58, 64, 65, 66, 67, 68, 69 and 72
3.0	None	None	Book #2 - Problems 4, 5, 6, 7, 8, and 9	None	#2, 3, 4, and 5
4.0	None	None	Book #3 - Problems 1, 2, 4, 5, 6, 7 and 9	None	#19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29 and 30
5.0	None	None	Book #1 - Problems 1, 2, 3, 6, 8, 9 and 10	None	#31, 32, 33, 34, 35, 36, and 37
6.0	None	None	None	#68, 69, and 71	None
7.0	Book #2 - Problems 5 and 9	None	None	#62 and 65	None
8.0	Book #1 - Problems 1, 2 Book #2 - Problem 2	None	None	#24, 27, 38, 39, 41, 42, 46, 47, 48, 52, 53 and 54	None
9.0	Book #2 - Problem 7	None	None	None	None

ADDITIONAL RESOURCE MATERIALS FOR

EARTH/PHYSICAL SCIENCE

WATER SUPPLY (Reprint from the Geological Survey)

This reprint discusses the problem of diminishing water pressure in the Florida Aquifer. What is being done to help regulate the problem is also shown. The reprint lists eight recommendations that the Florida Geological Survey has made to preserve the Aquifer. Among these are tapping free flowing wells and rebuilding the municipal water system.

THE FLORIDA HANDBOOK (Compiled by Allen Morris, Peninsular Publishing Company, Tallahassee, Florida - printed yearly) found in most school libraries.

The Florida Handbook, which is printed yearly and used as a basic text for the Florida History course, contains a section on Oil and Mineral Production in the State. This section discusses variety, quantity, and quality of Florida's water resources, various mineral deposits, and drilled fuels.

THE GREEN PLAN - A Basic Understanding of Florida's Resource Limitations as a Foundation for Land Use Planning (from the Florida Department of Administration, Division of State Planning, Second Edition, June 1975) it can be obtained from the aforementioned department or by contacting the Supervisor of Science.

Florida's fresh water, natural, forest, agricultural, and archaeological resources are presented in this small booklet. There are numerous maps, pictures, diagrams, and drawings that are suitable for classroom use. Especially helpful are the Florida maps showing where resources are presently located.

ATLAS OF FLORIDA (Compiled by Erwin Raisz and Associates, University of Florida Press, Gainesville, Florida -1964 edition) found in most school libraries.

EARTH SCIENCE -THE WORLD WE LIVE IN (Namowitz and Stone, American Book Company, fifth edition, 1975 - earlier editions also recommended) found in most schools available from Florida Book Depository.

This textbook has been widely used in Duval County and offers a very fine overview of all aspects of the Earth Sciences. Teachers who have questions on the Earth Science Objectives in Earth/Physical Science 8 would be well advised to consult this text.

INTRODUCTION
EARTH/PHYSICAL SCIENCE

State Accreditator Number. . 1354
Course Code Number 2261
F.T.E. Category. 1.00
Instructional Level. . . . . Advanced

Report Card Abbreviation . . Earth/Phys Sci
Length of Course . . . . . . Year
Credit . . . . 1 Science credit
Grade Level. 8

Prerequisites

Life Science 7, Advanced and departmental approval. The student must be enrolled in Pre-algebra or Algebra I.

Textbook(s)

Haber-Schaim, Uri, et al, Introductory Physical Science, Fourth edition (Englewood Cliffs, New Jersey: Prentice-Hall, 1982).

Namowitz, Samuel N. and Stone, Donald D., Earth Science (Lexington, Massachusetts: D. C. Heath and Company, 1981).

Laboratory Manual

Namowitz, Samuel N., Earth Science Activities (Lexington, Massachusetts: D. C. Heath and Company, 1981).

Notes To Teacher

Full performance objectives are presented in addition to the Minimum Level Skills (MLS) objectives. Students are to develop laboratory and research skills. The earth science related laboratory exercises are indicated with a plus sign (+). This portion of the course is expected to be covered after the Minimum Level Skills Test (MLST). Each Essential Laboratory (EL) activity must be experienced, and documentation is to be kept by EL number in the teacher's gradebook. In addition, the teacher is to keep on file copies of each student's activity sheets for the EL's performed. One physical science laboratory activity for each unit will meet this requirement.

Objective 1.0 has been included in an effort to present students with information that is not included in the text. Most of objective 1.0 may be taught by using:

1. Focus on Physical Science
   Second Edition by C. H. Heimler and J. Price
   (Columbus, Ohio: Charles E. Merrill, 1974).

2. Physical Science
   1979 Edition by C. B. Barman, et al.
   (Morristown, N. J.: Silver Burdett Co., 1979)

Laboratory tests - Experience has shown that laboratory tests fit well at certain points in the course:

(1) A test on determining mass and density may be given after the completion of performance objective 2.5.

(2) A test on determining the melting point of a solid and the boiling point of a liquid may be given after the completion of performance objective 3.1.

(3) A test on determining the density of a regularly and an irregularly shaped object may be given after the completion of performance objective 3.2.

Student Record Keeping - In addition to the information given in the guide under "Student Laboratory Notebooks," pages 12-15, the following suggestions are offered:

(1) The guide suggests that there should be no structured format for the student to follow to record experimental data. However, experience has shown that a structured laboratory format can be very helpful.

(2) Laboratory data should be recorded by each student in the laboratory notebook as an original record, at the time the data are acquired.

(3) Special pages in the laboratory notebook can be designated and used for computations. Be sure students label all data on these pages. This is helpful in the event a student needs to recheck his computations.

Laboratory Safety - Safety is a requirement in the laboratory, and instruction in proper laboratory safety procedures and methods should be presented. The teacher's guide discusses "Safety," pages 11-12. Students should sign a laboratory safety contract.

A list of consumable supplies and laboratory equipment is presented on pages 21 and 22 of the teacher's guide. In addition to passing the MLST, every student is required to complete an individual laboratory investigation.

COURSE OUTLINE

EARTH/PHYSICAL SCIENCE

- 1.0 Scientific Method/Data Management/Laboratory Equipment/Procedures
  - 1.1 Scientific Method
    - *1.1.1 Step identification
    - 1.1.2 Step explanation
    - 1.1.3 Experiment design
    - *1.1.4 Variables/Control
    - *1.1.5 Conclusion
  - 1.2 Data Management
    - 1.2.1 Graphs/Data table purposes
    - 1.2.2 Data table construction
    - *1.2.3 Data table interpretation
    - 1.2.4 Bar/Line graph construction
    - *1.2.5 Bar graph interpretation
    - *1.2.6 Line graph interpretation
    - *1.2.7 Scientific notation
  - 1.3 Laboratory Equipment/Procedures
    - *1.3.1 Equipment identification
    - 1.3.2 Safety procedures
    - 1.3.3 Set-up/Clean-up procedures
    - 1.3.4 Record keeping
  - ●1.4 Experimental Investigation: Wood Distillation

- 2.0 Volume/Scale Reading/Mass Determination
  - 2.1 Volume
    - *2.1.1 Volume definition
    - *2.1.2 Volume calculation: regular shape
    - ●2.1.3 Volume measurement: regular shape
  - 2.2 Reading Scales
    - *2.2.1 Linear metric measurement
    - *2.2.2 Graduated cylinder
  - 2.3 Volume Determination: Water Displacement
    - ●2.3.1 Sand
    - *2.3.2 Irregular shape
    - *2.3.3 Air
  - 2.4 Mass/Volume Measurement Limitations
  - 2.5 Equal-Arm Balance
    - ●2.5.1 Assembly/Calibration/Determination precision
    - *2.5.2 Data precision
    - 2.5.3 Precision: method
  - 2.6 Mass In Measurement
    - ●2.6.1 Change: solid in water
    - ●2.6.2 Change: solid to liquid
    - ●2.6.3 Change: mixing liquids
    - *2.6.4 Change: from data
    - ●2.6.5 Change: heating solids
    - ●2.6.6 Change: gas production
    - *2.6.7 Change: gases from solid, liquid
    - 2.6.8 Mass/Shape
    - *2.6.9 Law of Conservation
    - 2.6.10 Laws: nature. society

- 3.0 Characteristic Properties
  - 3.1 Freezing/Melting/Boiling Points
    - ●3.1.1 Freezing point determination
    - ●3.1.2 Micro-melting point: solid
    - *3.1.3 Determination from graph

* Indicates Minimum Level Skills
+ Indicates Recommended Laboratory Activities
● Indicates Essential Laboratory Activities

EARTH/PHYSICAL SCIENCE

- ●3.1.4 Boiling point: liquids
- *3.1.5 Boiling point from graph
- 3.2 Density
  - *3.2.1 Definition
  - *3.2.2 Significant digits
  - ●3.2.3 Solid, liquid, gas: determination
  - *3.2.4 Calculation
  - 3.2.5 Range comparison
- 3.3 Substance Identification
  - *3.3.1 Properties comparison
  - 3.3.2 Substance comparison

4.0 Solubility

- 4.1 Solids
  - ●4.1.1 Dissolved, liquid
  - *4.1.2 Solutions: term definitions
  - *4.1.3 Solution: saturated
  - *4.1.4 Solution: concentrations
  - ●4.1.5 Temperature effect
  - *4.1.6 Solubility curve
  - 4.1.7 Wood alcohol/ Grain alcohol: characteristics
  - ●4.1.8 Substance identification
- 4.2 Gases
  - 4.2.1 Sulfuric acid: useful property
  - ●4.2.2 Two gases
  - *4.2.3 Hydrogen: characteristics
  - *4.2.4 Carbon dioxide: characteristics
  - 4.2.5 General conditions
  - ●4.2.6 Ammonia

5.0 Substance Separation

- 5.1 Liquid Mixtures
  - ●5.1.1 Fractional distillation
  - *5.1.2 Fractions identification
  - 5.1.3 Petroleum separation procedure
  - *5.1.4 Petroleum product identification
- 5.2 Solids Mixtures
  - *5.2.1 Separation: insolubles
  - ●5.2.2 Separation: soluble, insoluble
  - *5.2.3 Separation: sulfur, salt procedure
  - 5.2.4 Soluble solid separation procedure
  - ●5.2.5 Fractional crystallization: potassium nitrate, sodium chloride
  - *5.2.6 Fractional crystallization: characteristic property
  - ●5.2.7 Paper chromatography: laboratory procedure
  - *5.2.8 Paper chromatography: result
- 5.3 Gas Mixtures
  - *5.3.1 Gas separation methods
  - 5.3.2 Comparison: liquid, gas, thermometers

COURSE OUTLINE

EARTH/PHYSICAL SCIENCE

- 5.4 Substance From Mixture
  - *5.4.1 Air properties
  - *5.4.2 Comparison: mixture, pure substance
  - ●5.4.3 Unknown mixture identification

6.0 The Earth's Crust

- 6.1 Minerals
  - 6.1.1 Definition: rock, mineral
  - 6.1.2 Common elements
  - 6.1.3 Definition: atom, element
  - 6.1.4 Atom structure
  - 6.1.5 Differentiation: compound, mixture
  - +6.1.6 Crystal formation
  - ●6.1.7 Minerals Identification
- 6.2 Rock Formation
  - 6.2.1 Igneous rocks: intrusive, extrusive
  - 6.2.2 Igneous rock: texture
  - +6.2.3 Sedimentary rock: identification
  - 6.2.4 Origin: coal petroleum
  - 6.2.5 Metamorphism
  - 6.2.6 Metamorphic, sedimentary rocks
  - 6.2.7 Rock cycle

7.0 Meteorology

- 7.1 Atmosphere Composition
  - 7.1.1 Nitrogen/Oxygen
  - 7.1.2 Water vapor/Ozone/Dust
  - 7.1.3 Temperature layers
  - 7.1.4 Ionosphere
- 7.2 Atmospheric Heat
  - 7.2.1 Weather definition
  - 7.2.2 Greenhouse effect
  - 7.2.3 Heat transfer
  - +7.2.4 Land, water heat absorption
  - +7.2.5 Dark, light heat absorption
  - 7.2.6 Temperature inversion
- 7.3 Air Temperature
  - 7.3.1 Measurement devices
  - 7.3.2 Isotherm
- 7.4 Evaporation/Condensation
  - 7.4.1 Water: states
  - 7.4.2 Water: changes
  - ●7.4.3 Evaporation
  - 7.4.4 Relative humidity
  - 7.4.5 Psychrometer
  - ●7.4.6 Dew point
  - 7.4.7 Condensation
- 7.5 Precipitation
  - 7.5.1 Types
  - 7.5.2 Measurement instrument
  - 7.5.3 Rain: when, where

8.0 Water Resources

- 8.1 Fresh Water Supply
  - 8.1.1 Hydrologic cycle
  - 8.1.2 Porosity, permeability importance
  - ●8.1.3 Porosity, permeability investigation
  - 8.1.4 Floridan Aquifer
  - 8.1.5 Underground water supplies
  - 8.1.6 Hard water
  - +8.1.7 Water comparison : hard, soft
  - 8.1.8 Budget/Water cycle

EARTH/PHYSICAL SCIENCE

8.2 Sea Water
- 8.2.1 Surface percentage/ Average depth/ Salinity
- 8.2.2 Oceans/Climate
- 8.2.3 Magnesium, sodium chloride
- +8.2.4 Comparison: sea, fresh water

PERFORMANCE OBJECTIVES
EARTH/PHYSICAL SCIENCE

To demonstrate ability to recall and apply knowledge of scientific methods, data management, laboratory equipment and procedures, distillation, mass, volume and density determination, scale reading, characteristic properties, solubility, substance separation, the earth's crust, meteorology, and water resources, students will master the performance objectives listed below. Successful completion of this course is based on teacher judgment, and a passing score on the Minimum Level Skills Test.

Performance Objectives

1.0 Scientific Method/Data Management/Laboratory Equipment/Procedures

1.1 To demonstrate knowledge of the scientific method, students will:

*(1) identify in order, the steps in the scientific method as identify problem, gather data, form hypothesis, conduct experiment, analyze results, and formulate conclusion;

(2) explain each step in the scientific method;

(3) design an experiment;

*(4) identify the variables and control from a description of an experiment; and

*(5) identify a valid conclusion from a description of an experiment.

1.2 To demonstrate knowledge of data management, students will:

(1) state the purposes of using data tables and graphs;

(2) construct a data table from a given data collection;

*(3) interpret data given on a table;

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* Indicates Minimum Level Skills
+ Indicates Recommended Laboratory Activities
# Indicates Essential Laboratory Activities

(4) construct bar and line graphs;

*(5) interpret information from a bar graph;

*(6) interpret information from a line graph; and

*(7) identify the scientific notation for a specified number.

1.3 To demonstrate knowledge of laboratory equipment and procedures, students will:

*(1) identify from a diagram a piece of common laboratory equipment: graduated cylinder, evaporating dish, crucible, beaker, burner stand, alcohol burner, or equal-arm balance;

(2) identify proper safety procedures for conducting laboratory investigations;

(3) explain procedures for obtaining and returning equipment, laboratory clean-up, and other housekeeping chores; and

(4) explain major points concerning record keeping.

●1.4 To demonstrate the ability to follow proper laboratory procedures, students will distill wood in the absence of air.

2.0 Volume/Scale Reading/ Mass Determination

2.1 To demonstrate knowledge of volume, students will:

*(1) identify a definition of the term volume as the amount of space a substance occupies;

*(2) calculate the volume of a regularly shaped object from a diagram; and

●(3) measure a slab with a metric ruler and calculate its volume.

2.2 To demonstrate knowledge of reading scales, students will:

*(1) determine the length of a line segment using a diagram of a line and metric ruler; and

*(2) determine, from a diagram, the amount of water in a graduated cylinder.

2.3 To demonstrate knowledge of volume determination by water displacement, students will:

●(1) determine the volume of a sample of sand;

*(2) identify the volume of an irregularly shaped solid in a graduated cylinder when the water levels are marked on a drawing before and after adding the solid; and

*(3) calculate the volume of air in a sample of sand when given the volume of the dry sand and the volume of sand without air.

2.4 To demonstrate knowledge of measurement limitations, students will compare and contrast volume and mass measurements such as when measuring solids and liquids.

2.5 To demonstrate knowledge of the use of the equal-arm balance, students will:

●(1) assemble and calibrate an equal-arm balance and determine its precision;

*(2) identify the precision of an equal-arm balance from specified data; and

(3) identify the method by which the precision of the equal-arm balance is calculated.

2.6 To demonstrate knowledge of the use of mass as a means for measuring matter, students will:

●(1) determine if a change in mass occurs when a solid is dissolved in water;

●(2) determine if a change in mass occurs when a solid changes to a liquid;

●(3) determine if a change in mass occurs when a solid is formed by mixing two liquids;

*(4) identify from given data whether a change in mass occurs when a solid is formed by mixing two liquids;

●(5) determine if there is a change in mass when two solids are heated together;

●(6) determine if there is a change in mass when a solid and a liquid produce a gas;

*(7) identify from given data whether a change in mass occurs when a solid and a liquid produce a gas;

(8) state that the mass of a piece of pliable material is not changed by changing its shape;

*(9) identify the generalization known as the Law of Conservation of Mass; and

(10) compare and contrast the laws of nature with the laws of society.

3.0 Characteristic Properties

3.1 To demonstrate knowledge of freezing, melting, and boiling points, students will:

●(1) determine the freezing point of a substance;

●(2) determine the micro-melting point of a solid;

*(3) identify the melting point or freezing point of a substance from a line graph;

●(4) determine the boiling points of liquids; and

*(5) identify the boiling point of a liquid from a line graph.

3.2 To demonstrate knowledge of density as a characteristic property, students will:

*(1) identify a definition of density as mass per unit volume of a substance;

*(2) identify significant digits from given data;

●(3) determine the densities of a solid, a liquid, and a gas using laboratory procedures;

*(4) calculate the density of a solid, a liquid, or a gas from given data; and

(5) compare the range of density of solids and liquids and the range of density of gases.

3.3 To demonstrate knowledge of the characteristic properties of substances, students will:

*(1) differentiate between substances by comparing their characteristic properties; and

(2) distinguish between properties which are characteristic of a substance and those which are characteristic only of an object made of that substance.

4.0 Solubility

4.1 To demonstrate knowledge of solubility of solids, students will:

●(1) determine a characteristic of a solid dissolved in a liquid when there are no changes in temperature;

*(2) distinguish among the terms solution, solute, solvent, and precipitate;

*(3) identify a definition of a saturated solution as one in which no more solid can be dissolved at a given temperature;

*(4) calculate the concentration of two saturated solutions and identify the more soluble substance;

●(5) determine the effect of temperature on solubility;

*(6) identify the solubility of a substance from a solubility curve;

(7) distinguish between wood alcohol and grain alcohol by comparing their characteristic properties; and

●(8) identify substances by their solubilities in methanol and water.

4.2 To demonstrate knowledge of the solubility of gases, students will:

(1) identify a useful property of sulfuric acid;

●(2) determine the characteristics of two gases that are produced when magnesium and magnesium carbonate are dissolved in sulfuric acid;

*(3) identify a characteristic of the gaseous form of hydrogen as hydrogen will burn or hydrogen when burned will produce water;

*(4) identify a characteristic of the gaseous form of carbon dioxide as the density of carbon dioxide is greater than air or that carbon dioxide does not burn;

(5) identify from a given situation the general conditions for solubility of gases; and

●(6) investigate the solubility of ammonia gas in water;

5.0 Substance Separation

5.1 To demonstrate knowledge of the separation of mixtures of liquids, students will:

●(1) separate a mixture of liquids using fractional distillation;

*(2) identify the fractions of a mixture of liquids collected, from a temperature-time graph of fractional distillation;

(3) discuss the procedure for separation of petroleum products; and

*(4) identify four products obtained from the fractional distillation of petroleum from a list which includes gasoline, kerosene, diesel fuel, heating oil, lubricating oil, butane, propane, paraffin, or asphalt.

5.2 To demonstrate knowledge of the separation of mixtures of solids, students will:

*(1) identify the method by which sand can be separated from sawdust;

●(2) separate a soluble solid from an insoluble solid by dissolving and filtering;

*(3) identify the method used to separate a mixture of sulfur and salt;

(4) outline a procedure for the separation of a mixture of soluble solids;

●(5) separate a mixture of potassium nitrate and sodium chloride using fractional crystallization;

*(6) identify the characteristic property on which fractional crystallization is based;

●(7) separate the solids of black ink by paper chromatography; and

*(8) compare a chromatograph of a mixture of two dissolved solids with the chromatographs of each individual dissolved solid.

5.3 To demonstrate knowledge of the separation of mixtures of gases, students will:

*(1) identify methods of separation of gases as 1) liquefaction and 2) fractional distillation; and

(2) describe the advantages of a gas thermometer over a liquid thermometer.

5.4 To demonstrate knowledge of the separation of a mixture of substances, students will:

*(1) identify the properties of air as being intermediate between the properties of its components;

*(2) distinguish between a mixture and a pure substance; and

●(3) identify the substances in an unknown mixture.

6.0 The Earth's Crust

6.1 To demonstrate knowledge of the minerals of the earth's crust, students will:

(1) define a rock as a mass or aggregate of minerals, and mineral as elements or compounds that occur naturally in the earth's crust in solid crystalline states;

(2) identify the most common elements in the earth's crust as oxygen, silicon, aluminum, iron, calcium, sodium, potassium, magnesium, titanium, and hydrogen;

(3) define atom and element;

(4) describe the structure of an atom;

(5) differentiate between a mixture and a compound;

+(6) investigate crystal formation; and

●(7) identify common minerals by determining their characteristic properties.

6.2 To demonstrate knowledge of rock formation, students will:

(1) define intrusive rocks as igneous rocks formed by hardening of magma below the earth's surface and extrusive rocks as igneous rocks formed by hardening of magma after it reaches the earth's surface;

(2) describe the texture of igneous rocks as coarse-grained, fine-grained and glassy;

+(3) identify common sedimentary rocks by origin, texture, and mineral content;

(4) identify the origin of coal and petroleum as being plants and animals;

(5) describe the processes by which metamorphic rocks form as being the action of heat, pressure, and chemicals;

(6) identify the methamorphic rocks which form from common sedimentary rocks; and

(7) diagram the rock cycle.

7.0 Meteorology

7.1 To demonstrate knowledge of the compositon and layers of the atmosphere, students will:

(1) identify nitrogen and oxygen as the two most abundant gases in the atmosphere;

(2) identify other important components of air as water vapor, ozone, and dust;

(3) identify the temperature layers as troposphere, stratosphere, mesophere, and thermosphere; and

(4) describe the ionosphere.

7.2 To demonstrate knowledge of the way in which heat affects the atomospere, students will:

(1) define weather as the state of the atmosphere at a given place and time;

(2) explain "the greenhouse effect";

(3) state that heat energy gets into the atmosphere or moves through it by conduction, convection, and radiation;

+(4) determine whether land and water differ in the absorption and radiation of heat energy;

+(5) determine whether light and dark surfaces differ in the rate at which they absorb and radiate heat energy; and

(6) describe temperature inversion as a condition of the troposphere that occurs when a layer of cool air is trapped over the earth's surface by an overlying layer of warm air.

7.3 To demonstrate knowledge of air temperature, students will:

(1) identify, from illustrations, devices for measuring air temperature such as liquid and metal thermometers or thermograph; and

(2) identify an isotherm on a map.

7.4 To demonstrate knowledge of the effects of evaporation and condensation on the atmosphere, students will:

(1) identify the three states of water;

(2) identify the change of a solid to a liquid as melting, the change of a liquid to a solid as freezing, the change of a liquid to a gas as evaporation, and the change of a gas to a liquid as condensation;

●(3) determine that the evaporation of a liquid removes heat from its surroundings;

(4) define relative humidity as a comparison of the amount of water vapor in the air with the air's capacity at that temperature;

(5) identify a psychrometer from an illustration;

●(6) determine dew point by using appropriate laboratory equipment; and

(7) identify dew, frost, clouds, and fog as forms of condensation.

7.5 To demonstrate knowledge of precipitation, students will:

(1) describe the types of precipitation as rain, snow, sleet, or hail;

(2) identify the instrument used to measure rainfall; and

(3) state that precipitation occurs in every part of the world, but rainy areas are those where air often rises in large quantities.

8.0 Water Resources

8.1 To demonstrate knowledge of the earth's fresh water supply, students will:

(1) identify the three parts of the hydrologic cycle as evaporation, condensation, and precipitation;

(2) explain the importance of the porosity and permeability of underlying rocks to water table formation as being that these rocks allow water to pass through them;

●(3) investigate the porosity and permeability of clay, sand, and gravel, relating them to the transportation of ground water;

(4) identify the Floridan Aquifer as the major permeable rock formation in Florida;

(5) describe underground water supplies by stating that shallow wells contain water from the bottom up to the level of the water table, in artesian wells water comes from aquifers below an impermeable layer, and springs are fissures in the cap rock;

(6) state that dissolved minerals that contain ions of calcium, magnesium or iron make water hard;

+(7) investigate the difference between hard water and soft water; and

(8) state that the water budget depends on the water cycle.

8.2 To demonstrate knowledge of the earth's sea water supply, students will:

(1) state that 71 per cent of the earth's surface is ocean, the average depth is about four kilometers, and the salinity is 35 parts per 1000;

(2) explain that the ocean affects climatic conditions by causing the land to be considerably warmer or cooler than is normal for a particular latitude;

(3) identify magnesium and sodium chloride as the two minerals which can be mined economically from sea water; and

+(4) investigate the differences between sea water and fresh water.

KEY TO RECOMMENDED INSTRUCTIONAL MATERIALS

Performance Objective		Instructional Implications		Resources	
Number	Topic	Teaching Time	Tested on	County Adopted Pages	Supplementary
1.0	Scientific Method/Data Management/ Laboratory Equipment/ Procedures	3-4 weeks	MLST	Uri Haber-Schaim, et al, Introductory Physical Science (Englewood Cliffs, N.J.: Prentice-Hall, 1982), 13-18.	C. Heimler and J. Prince, Focus On Physical Science (Columbus, Ohio: Charles E. Merrill, 1974), pp. 4-21. Charles R. Barman, et al, Physical Science (Morristown, N.J.: Silver Burdett Co., 1979), pp. 3-10, 25-39, 407-11.
2.0	Volume/Mass Determination/ Scale Reading	4-5 weeks	MLST	Haber-Schaim, 19-44.	
3.0	Characteristic Properties	4 weeks	MLST	Haber-Schaim, 45-68.	
4.0	Solubility	4 weeks	MLST	Haber-Schaim, 69-88.	
5.0	Substance Separation	6 weeks	MLST	Haber-Schaim, 89-115.	
6.0	Geology	2 weeks		Namowitz, S.N., et al, Earth Science, 22-27, 29, 31-34, 36-48, 50-72.	

KEY TO RECOMMENDED INSTRUCTIONAL MATERIALS

Performance Objective		Instructional Implications		Resources	
Number	Topic	Teaching Time	Tested on	County Adopted Pages	Supplementary
7.0	Meteorology	2-3 weeks		Namowitz, Samuel N., Earth Science Activities. 1-10, 13-16, 21-22. Namowitz, Earth Science. 373-78, 380-83, 385-86, 416-23, 432-36. Namowitz, Activities. 91-93, 107-12.	
8.0	Water Resources	2-3 weeks		Namowitz, Earth Science. 25-28, 93-100, 103, 225-30, 409-11, 470-75. Namowitz, Activities. 25-28, 47-48.	Earth/Physical Science Resource Packet

Haber-Schaim, Introductory Physical Science (Englewood Cliffs, N.J.: Prentice-Hall, 1982), Chapters 1-5.

KEY TO LABORATORY RESOURCES

Objective	Skill	County Adopted Text Pages	Other Resources
1.0 - 5.0	These skills are part of the Introductory Physical Science (IPS) curriculum which is laboratory-oriented. The objectives are written in the order of their occurrence in the IPS text (Chapters 1-5).		
	Students will:		
6.1.6	compare the formation of different types of crystals.	Namowitz, Samuel N., Earth Science Activities, 1-2.	
6.1.7	identify common minerals.	Namowitz, Activities, 3-10.	
6.2.3	identify common sedimentary rocks.	Namowitz, Activities, 13-16.	
7.2.4	determine whether land and water differ in the absorption and radiation of heat energy.	Namowitz, Activities, 91-92.	

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KEY TO LABORATORY RESOURCES

Objective	Skill	County Adopted Text Pages	Other Resources
7.2.5	determine whether light and dark surfaces differ in the rate at which they absorb and radiate heat energy.	Namowitz, Activities, 93.	
7.4.3	determine that the evaporation of a liquid removes heat from its surroundings	Namowitz, Activities, 107-8.	
7.4.6	determine dew point.	Namowitz, Activities, 109-11	
8.1.3	investigate porosity and permeability.	Namowitz, Activities, 25-26.	
8.1.7	investigate differences between hard water and soft water.	Namowitz, Activities, 27-28.	
8.2.4	investigate differences between sea water and fresh water.	Namowitz, Activities, 47-48.	

INTRODUCTION
EARTH SCIENCE 9

State Accreditator Number. .	1343
Course Code Number	2235
F.T.E. Category.	1.0
Instructional Level.	Standard

Report Card Abbreviation . .	Earth Science 9
Length of Course	Year
Credit	1 Science credit
Grade Level.	9

Prerequisites

None

Textbook(s)

Ramsey, W. L., et al, Holt Earth Science (New York: Holt, Rinehart, and Winston, 1982).

Notes to Teachers

This course includes higher level as well as minimum level objectives. Some effort has been made to require higher thought processes than knowledge and comprehension in a number of objectives. In addition, students are to develop laboratory skills both in and out of the classroom.

The Minimum Level Skills (MLS) objectives are indicated with an asterisk (*) and will be the only objectives tested on the Minimum Level Skills Test (MLST). The "Teaching Time" listed on the Key to Instructional Materials is a suggested range to help ensure that all MLS objectives can be met by Minimum Level Skills Test time.

Essential laboratory activities are indicated with an encircled plus sign (⊕) and are required of every student. Laboratory activities that are not required are indicated with a plus sign (+), but it is strongly recommended that all of these be completed by each student. Additional activities are encouraged.

A resource packet for earth science accompanies this guide and may be obtained by contacting the Science Office, 390-2129.

Toward the end of Objective 1.0 (Earth Composition), the activity "Assembling Crustal Plates" (Ramsey, pp. 22-23) might be added. It provides a good introduction to Earth Forces (2.0) and the completed jigsaw puzzle map later. A copy master for this activity appears on p. T39 of the teacher's edition of the textbook and on p. T26 of the resource book.

Students will enter Objective 2.0 (Earth Forces) with a variety of information and misinformation on continental drift. The original theory of continental drift, proposed by Wegner, had the continents moving through the solid crust. Plate tectonics theory holds that the crust itself, broken into a number of plates, is in motion and carrying the continents along in the process. Students should be encouraged to replace the older continental drift terminology with the new plate tectonics idea.

Objective 3.0 (Weathering/Erosion) is presented in such a way as to relate the ideas to the local environment. In 3.4.2, the St. Johns River is used as an example for identification of river system features. In 3.4.3, the St. Johns is used again in a challenging higher-level objective that calls for students to draw a conclusion from provided facts. It is important to stress the process rather than the conclusion; indeed, there is some disagreement among the experts on what the correct answer really is. Specific details may be found in the resource packet. In 3.7, the frequency of drownings of young people in our area provides a rationale for the approach taken in the objectives dealing with wave action.

Objective 4.0 (Atmosphere/Weather) includes acid rain (4.1.4) and severe storm systems (4.3.6, 4.3.7), both important to Jacksonville. Information is provided in the resource packet.

Objective 5.0 (The Oceans) might be enriched for the above-average student by relating Physical Science 8 concepts of wavelength, height, and period of a water wave. A glass bowl filled with water, into which water drops are allowed to fall could be placed on an overhead projector for a large-group demonstration; or a fish tank with a fan blowing across the water's surface would lend itself to small-group investigation. Teachers having access to a copy of Exploring Earth Science by Kilburn and Howell (Boston: Allyn and Bacon, 1981) will find an excellent demonstration of tidal bulges on page 263.

Objective 6.0 (Water Resources) relates almost entirely to Florida and requires extensive teacher use of Florida's Water: A Shared Resource, compiled by the Water Resources Council of the Institute of Food and Agricultural Sciences. This booklet and a number of other references and resources are included in the resource packet.

Objective 7.0 (Space) includes several laboratories which require direct observations of the night sky. The resource packet includes suggestions for evaluating the finished product. A glossary of terms and additional explanatory materials are provided in the resource packet.

Finally, Objective 8.0 (Earth History/Fossil Fuels) which follows the MLST, continues to relate content to Jacksonville situations with 8.4.4 dealing with coal-fired power plants. In 8.1.1, the term for "principle of uniform process" is uniformitarianism, which may be familiar to some students with special interest in the geological sciences.

COURSE OUTLINE

EARTH SCIENCE 9

1.0 Earth Composition

- 1.1 Earth's Interior
  - *1.1.1 Three layers
  - 1.1.2 Layer characteristics
- 1.2 Minerals
  - *1.2.1 Definition
  - 1.2.2 Crystal form
  - 1.2.3 Properties
  - ●1.2.4 Identification
- 1.3 Rocks
  - *1.3.1 Groupings
  - 1.3.2 Igneous types
  - 1.3.3 Sediment formation
  - 1.3.4 Metamorphic types
  - 1.3.5 Examples
  - 1.3.6 Rock cycle
- 1.4 Soil
  - *1.4.1 Composition
  - *1.4.2 Soil horizon
  - ●1.4.3 Soil analysis

2.0 Earth Forces

- 2.1 Plate Tectonics
  - *2.1.1 Definition
  - *2.1.2 Sea floor spreading
  - 2.1.3 Mid-ocean ridge
  - ●2.1.4 Convection currents
- 2.2 Earthquakes
  - *2.2.1 Description
  - *2.2.2 Fault
  - *2.2.3 Source
  - ●2.2.4 Locations
  - +2.2.5 Origins
- 2.3 Volcanoes
  - 2.3.1 Island chains
  - *2.3.2 Magma/Lava
  - 2.3.3 Scientific value
  - +2.3.4 Locations
- 2.4 Changing Features
  - 2.4.1 Plate edges
  - 2.4.2 Isostasy
  - 2.4.3 Mountain formation
  - +2.4.4 Density

3.0 Weathering/Erosion

- *3.1 Weathering Definition
- 3.2 Weathering Processes
  - 3.2.1 Chemical methods
  - 3.2.2 Physical methods
  - ●3.2.3 Chemical investigation
- *3.3 Erosion Definition
- 3.4 Running Water Erosion
  - *3.4.1 Erosion methods
  - 3.4.2 River systems
  - 3.4.3 River evolution
- 3.5 Ice Erosion
  - 3.5.1 Glacier formation
  - 3.5.2 Glacier movement
- 3.6 Wind Erosion
  - 3.6.1 Loess formation
  - *3.6.2 Sand dune formatio
  - +3.6.3 Windblown deposits
- 3.7 Wave Erosion
  - *3.7.1 Methods
  - *3.7.2 Shoreline features
  - 3.7.3 Safety hazards

4.0 Atmosphere/Weather

- 4.1 Atmosphere
  - *4.1.1 Composition
  - 4.1.2 Carbon dioxide cycle
  - 4.1.3 Pollutants
  - *4.1.4 Acid rain
  - *4.1.5 Layer names
  - 4.1.6 Ozone layer/Ionize region
  - 4.1.7 Greenhouse effect
  - ●4.1.8 Oxygen percentage
- 4.2 Wind/Water
  - 4.2.1 Wind causes
  - 4.2.2 Land, sea breezes
  - *4.2.3 Coriolis effect
  - *4.2.4 Humidity/Relative humidity/Dew poin
  - 4.2.5 Dew/Fog/Frost
  - +4.2.6 Convection curren
  - ●4.2.7 Evaporation cooli

* Indicates Minimum Level Skills
+ Indicates Recommended Laboratory Activities
● Indicates Essential Laboratory Activities

EARTH SCIENCE 9

- 4.3 Weather
  - 4.3.1 Cloud formation
  - *4.3.2 Cloud types
  - 4.3.3 Precipitation types
  - 4.3.4 Air mass
  - *4.3.5 Fronts
  - *4.3.6 Thunderstorm/Tornado/Hurricane
  - 4.3.7 Storm precautions
  - 4.3.8 Weather instruments
  - +4.3.9 Cloud altitudes

5.0 The Oceans

- 5.1 Ocean Floor
  - 5.1.1 Profiling methods
  - *5.1.2 Sea floor features
  - 5.1.3 Continental edge features
  - +5.1.4 Constructing profiles
- 5.2 Sea Floor Sediments
  - 5.2.1 Sediment feature formation
  - *5.2.2 Organic/Inorganic sediment
  - 5.2.3 Core sampling methods
- 5.3 Sea Water
  - 5.3.1 Salinity
  - 5.3.2 Contrasting depths
  - *5.3.3 Resources
- 5.4 Currents/Waves
  - 5.4.1 Currents
  - 5.4.2 Turbidity currents
  - 5.4.3 Gulf Stream
  - *5.4.4 Wave causes
  - *5.4.5 Tsunami
  - 5.4.6 Tides

6.0 Water Resources

- 6.1 Fresh-Water Source/Use
  - 6.1.1 Hydrologic cycle
  - 6.1.2 Florida water supply
  - 6.1.3 Florida water use
  - +6.1.4 Personal water use
- 6.2 Underground Water
  - *6.2.1 Permeability/Porosity
  - *6.2.2 Water table
  - 6.2.3 Surface feature relationships
  - 6.2.4 Caves/Sinkholes
  - 6.2.5 Artesian wells
- 6.3 Floridan Aquifer
  - *6.3.1 Definition
  - *6.3.2 Deep aquifer
  - *6.3.3 Duval County water
  - 6.3.4 Salt water intrusion
  - 6.3.5 Recharge area

7.0 Space

- 7.1 Planet Earth
  - *7.1.1 Revolution/Rotation
  - 7.1.2 Precession
  - 7.1.3 Motion effects
  - *7.1.4 Seasons
  - +7.1.5 Measuring rotation
- 7.2 The Moon
  - *7.2.1 Phases
  - 7.2.2 Eclipses
  - 7.2.3 Face orientation
  - 7.2.4 Surface features
  - +7.2.5 Recording observations
- 7.3 Solar System
  - *7.3.1 Sun/Star
  - 7.3.2 Planet/Moon
  - *7.3.3 Planet distances
  - 7.3.4 Planet sizes
  - 7.3.5 Asteroids/Meteors/Comets
  - 7.3.6 Inner planets
  - 7.3.7 Outer planets
  - 7.3.8 Satellites
  - 7.3.9 Pluto's orbit
  - +7.3.10 Observing planets
- 7.4 Universe
  - *7.4.1 Constellation definition
  - *7.4.2 Galaxy/Universe
  - 7.4.3 Light year
  - 7.4.4 Lives of stars

- 7.4.5 Quasar/Supernova/Neutron star/Black hole
- 7.4.6 Constellation recognition
- 7.5 Space Exploration
  - 7.5.1 Sputnik/Viking/Voyager
  - 7.5.2 Vostok/Mercury/Apollo/Soyuz/Salyut/Space Shuttle
  - *7.5.3 Future programs
  - 7.5.4 Space shuttle role

8.0 Earth History/Fossil Fuels

- 8.1 Rock Record
  - 8.1.1 Uniform process
  - 8.1.2 Superposition/Horizontal layering
  - 8.1.3 Unconformity
- 8.2 Fossils
  - 8.2.1 Definition
  - 8.2.2 Formation methods
  - 8.2.3 Key bed/Index fossil
- 8.3 Geologic Dating/History
  - 8.3.1 Radioactive decay
  - 8.3.2 Half-life
  - 8.3.3 Eras: characteristics
- 8.4 Fossil Fuels
  - 8.4.1 Definition
  - 8.4.2 Sources
  - 8.4.3 Coal forms
  - 8.4.4 Coal-fired plants

PERFORMANCE OBJECTIVES
EARTH SCIENCE 9

To demonstrate the ability to recall and apply knowledge of earth composition, earth forces, weathering and erosion, atmosphere and weather, the oceans, water resources, space and earth history, and fossil fuels, students will master the performance objectives listed below. Successful completion of Earth Science 9 is based on teacher judgment and the requirement that students pass the Minimum Level Skills Test.

Performance Objectives

1.0 Earth Composition

1.1 To demonstrate knowledge of the earth's interior, students will:

*(1) identify, from a diagram, a layer of the earth's interior as crust, mantle or core; and

(2) compare and contrast the physical properties of the earth's crust, mantle, and core.

1.2 To demonstrate knowledge of minerals, students will:

*(1) identify a definition of mineral as a substance found in the earth that always has the same properties;

(2) describe crystal as a mineral form with a definite shape that results from the arrangement of its atoms or similar particles;

(3) describe the properties of minerals useful in identification as luster, color, streak, hardness, and cleavage; and

●(4) identify an unknown mineral by applying identification properties of luster, color, streak, hardness, or cleavage.

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* Indicates Minimum Level Skills
+ Indicates Recommended Laboratory Activities
● Indicates Essential Laboratory Activities

1.3 To demonstrate knowledge of rocks, students will:

*(1) identify the names of the three large groupings of rocks - igneous, sedimentary, or metamorphic - from a description of their origins;

(2) identify two major types of igneous rock as intrusive and extrusive;

(3) describe three ways in which sediments are formed;

(4) describe two ways in which metamorphic rocks are formed;

(5) give an example of igneous, sedimentary, and metamorphic rocks; and

(6) construct a diagram or model of a rock cycle.

1.4 To demonstrate knowledge of soil, students will:

*(1) identify two groups of materials found in the soil as organic and inorganic;

*(2) identify a definition of soil horizon; and

●(3) analyze a sample of soil.

2.0 Earth Forces

2.1 To demonstrate knowledge of plate tectonics, students will:

*(1) identify plate tectonics as the theory that states the earth is made up of moving plates;

*(2) identify sea floor spreading as the way new material is added to the crust;

(3) describe the mid-ocean ridge and its relationship to sea floor spreading; and

●(4) demonstrate the way in which slow-moving convection currents in the mantle may provide the driving force for moving plates.

2.2 To demonstrate knowledge of earthquakes and their relationship to crustal plates, students will:

*(1) identify a description of earthquake as a sudden movement in the earth's crust along a fault;

*(2) identify a definition of fault as a place where rock has moved along either one or both sides of a crack in the earth's crust;

*(3) identify movement of crustal plates as a source of earthquakes;

*(4) determine a relationship between crustal plates and earthquakes by plotting earthquake locations on a world map showing crustal plate boundaries; and

+(5) determine the origin of earthquakes when given data on the time lag between p and s waves for several stations.

2.3 To demonstrate knowledge of volcanoes and their relationship to crustal plates, students will:

(1) identify the existence of island chains as evidence of crustal movement and hot spots;

*(2) identify the difference between magma and lava as being the location of the molten material;

(3) explain how careful study of volcanic eruptions like Mt. St. Helens contributes to an understanding of earth's geologic past and its present interior; and

+(4) determine a relationship between crustal plates and volcanic activity by plotting the locations of volcanoes on a world map showing crustal plate boundaries.

2.4 To demonstrate knowledge of earth's changing features and their relationship to crustal plates, students will:

(1) summarize the role played by plate edges in the formation of mountains, oceanic trenches, and island arcs;

(2) describe an example of isostasy as one part of the earth's crust sinking in an effort to balance a rising part somewhere else on the mantle;

3) discuss the formation of three types of mountains, folded features, and plateaus by isostasy and plate movement; and

+(4) investigate the relationship between density and isostasy by calculating density of an object by displacement.

3.0 Weathering/Erosion

*3.1 Students will identify the definition of weathering as the breaking of solid rock into small pieces.

3.2 To demonstrate knowledge of the processes of weathering, students will:

(1) describe four ways air and water cause chemical weathering;

(2) describe three ways rocks can be broken up in physical weathering; and

●(3) investigate chemical weathering.

*3.3 Students will identify the definition of erosion as all the processes that cause rock to be carried away.

3.4 To demonstrate knowledge of running water as an agent of erosion, students will:

*(1) identify a way in which water erodes the land as dissolving, carrying, or rolling soil and rock particles;

(2) label a diagram of the St. Johns River system, identifying drainage basin or watershed, runoffs, tributaries, bed, banks, mouth, and flood plain; and

(3) determine the relative age of the St. Johns River from a comparison of its features with those characteristic of young and old rivers.

3.5 To demonstrate knowledge of ice as an agent of erosion, students will:

(1) describe the way in which glaciers are formed; and

(2) describe the ways in which glacial movement affects the land.

3.6 To demonstrate knowledge of wind as an agent of erosion, students will:

(1) describe the formation of loess;

*(2) identify wind-blown sand being deposited around a barrier which slows its speed as a description of how sand dunes are formed; and

+(3) simulate windblown deposits.

3.7 To demonstrate knowledge of waves as an agent of erosion, students will:

*(1) identify pounding or abrasion as a way in which waves erode the land;

*(2) identify a description of sand bars, long-shore currents, or run-outs; and

(3) describe potential safety hazards to swimmers posed by sand bars, long-shore currents, and run-outs.

4.0 Atmosphere/Weather

4.1 To demonstrate knowledge of the earth's atmosphere, students will:

*(1) identify the five gases found in the atmosphere as nitrogen, oxygen, argon, carbon dioxide, or water vapor;

(2) describe the carbon dioxide cycle;

(3) identify five common air pollutants as particulates, carbon monoxide, nitrogen oxides, hydrocarbons, and sulfur dioxide;

*(4) identify acid rain as raindrops containing dissolved sulfur dioxide and nitrogen oxides produced by burning of coal and oil in power plants and industries;

*(5) identify the name of a layer of the earth's atmosphere from the surface, as troposphere, stratosphere, mesosphere, or thermosphere;

(6) describe the importance of the ozone layer and the ionized region of the atmosphere;

(7) describe the greenhouse effect; and

●(8) determine the percentage of oxygen in the atmosphere.

4.2 To demonstrate knowledge of wind and water, students will:

(1) describe the causes of wind;

(2) describe the formation of land and sea breezes;

*(3) identify the Coriolis effect as the deflection of wind caused by the earth's rotation;

*(4) identify definitions of absolute humidity, relative humidity, or dew point;

(5) describe the formation of dew, fog, and frost;

+(6) demonstrate convection currents; and

●(7) demonstrate the cooling that results when water evaporates.

4.3 To demonstrate knowledge of the earth's weather, students will:

(1) describe the stages in the formation of clouds;

*(2) identify from descriptions the three types of clouds;

(3) identify four types of precipitation as rain, hail, sleet, or snow;

(4) define air mass;

*(5) identify descriptions of warm, cold, occluded, or stationary fronts;

*(6) identify a description of thunderstorm, tornado, or hurricane;

(7) describe precautions to minimize threats to life and property from major destructive effects of thunderstorms, tornadoes, and hurricanes;

(8) identify the names of weather instruments used to measure rainfall, wind speed, wind direction, and air pressure; and

+(9) investigate temperature, dew point, and cloud altitude.

5.0 The Oceans

5.1 To demonstrate knowledge of the ocean floor, students will:

(1) explain the methods used to construct profiles of the ocean floor;

*(2) identify from a description sea floor, seamount, mid-ocean ridge, guyot, trench, or hydrothermal vent;

(3) identify definitions of continental slope and continental shelf; and

+(4) construct a profile map of the ocean floor from given echo sounding data, identifying seafloor features which appear.

5.2 To demonstrate knowledge of sea floor sediments, students will:

(1) describe the relationship of sediment movement to the formation of submarine canyons, continental rise, and abyssal plains;

*(2) identify ooze as a sea floor sediment formed from the remains of living things, or red clay as a sea floor sediment formed from river-borne particles and windblown dust; and

(3) describe the methods used by oceanographers to gather core samples.

5.3 To demonstrate knowledge of sea water, students will:

(1) identify a definition of salinity;

(2) contrast the upper 100 meters of ocean with the lower depths as to temperature, light, dissolved gases, and life forms; and

*(3) identify a resource that can be obtained from the sea as plankton, minerals, or petroleum and natural gas.

5.4 To demonstrate knowledge of ocean currents and waves, students will:

(1) define current and list three causes of currents in the sea;

(2) discuss turbidity currents;

(3) describe the origin and characteristics of the Gulf Stream;

*(4) identify a cause of wave as wind, earthquake, or attraction of the sun and moon;

*(5) identify a description of tsunami as a giant wave caused by a sudden disturbance of the sea floor; and

(6) discuss the causes of tides.

6.0 Water Resources

6.1 To demonstrate knowledge of the source and uses of fresh water, students will:

(1) diagram the hydrologic cycle;

(2) identify the original source of Florida's fresh water supply as rainfall;

(3) discuss the major areas of water use in Florida, citing examples of each; and

+(4) determine the quantity of water a person uses in one day.

6.2 To demonstrate knowledge of underground water, students will:

*(1) identify a definition of permeability or porosity;

*(2) identify a definition of water table;

(3) describe the relationship of lakes, swamps, rivers, springs, geysers, and wells to the water table;

(4) describe the formation of caves and sinkholes; and

(5) compare artesian with non-artesian wells.

6.3 To demonstrate knowledge of the Floridan Aquifer, students will:

*(1) identify aquifer as an underground bed of porous rock or soil that carries or holds water;

*(2) describe the deep aquifer as deep water confined by relatively impermeable strata, under pressure, and slow to replenish;

*(3) identify the Floridan Aquifer as the source of Duval County's water;

(4) identify deep well overpumping as contributing to salt water intrusion; and

(5) define recharge area.

7.0 Space

7.1 To demonstrate knowledge of the earth as a planet, students will:

*(1) identify a definition of revolution as the movement of one body about another body or rotation as the spinning of a body about an axis;

(2) identify a definition of precession as the wobbling motion of a rotating body;

(3) describe the major observable effects of the earth's revolution, rotation, and precession;

*(4) identify the causes of the earth's seasons as an elliptical orbit or the tilting of the axis; and

+(5) use the stars to measure the earth's rotation period.

7.2 To demonstrate knowledge of the moon as a satellite, students will:

*(1) identify the moon's phase from a given position on a diagram of the moon's orbit;

(2) describe the type of eclipse visible at a given position from a diagram of the moon's orbit;

(3) explain why the moon shows only one "face" to observers on earth;

(4) describe features of the surface of the moon; and

+(5) record telescopic, binocular, or naked-eye observations of the moon.

7.3 To demonstrate knowledge of the solar system, students will:

*(1) identify a definition of the sun or a star as a self-luminous body of gases which shines by nuclear processes;

(2) identify a definition of planets or moons as dark bodies which orbit a star and shine by reflected light;

*(3) identify the name of a planet by its order in distance from the sun;

(4) identify the name of a planet by its order in size, largest to smallest;

(5) describe asteroids, meteors, and comets;

(6) compare and contrast the surface features and physical characteristics of Mercury, Venus, and Mars with those of the Earth;

(7) compare and contrast the physical characteristics of Jupiter, Saturn, Uranus, and Neptune with those of the Earth;

(8) describe the satellite systems of Mars, Jupiter, and Saturn;

(9) explain why the orbit of Pluto is unique among the planets; and

+(10) record telescopic, binocular, or naked-eye observations of a planet.

7.4 To demonstrate knowledge of the universe, students will:

*(1) identify a definition of constellation as a random group of stars which resemble a familiar shape;

*(2) identify definition of galaxy or universe;

(3) define light year;

(4) compare the stages in the life history of a typical star like the sun with those of a star several times more massive;

(5) describe quasar, supernova, neutron star, and black hole; and

(6) identify the names and appearances of at least two constellations visible for each season of the year and two year-round circumpolar constellations.

7.5 To demonstrate knowledge of space exploration, students will:

(1) describe the unmanned missions Sputnik, Viking, and Voyager;

(2) describe the manned missions Vostok, Mercury, Apollo, Soyuz, Salyut, and Space Shuttle;

*(3) identify descriptions of the future programs: Galileo as a 1985 mission to orbit Jupiter to study its satellites and atmosphere; Space Telescope as a large telescope to be carried into orbit by the Space Shuttle in 1985; or Spacelab as a cooperative manned laboratory which Europe and America will place in orbit aboard the Space Shuttle in 1983; and

(4) discuss the role of the Space Shuttle in America's future in space.

8.0 Earth History/Fossil Fuels

8.1 To demonstrate knowledge of the way in which geologists interpret the rock record, students will:

(1) identify a definition of the principle of uniform process;

(2) discuss the law of superposition and the significance of horizontal layering; and

(3) describe an unconformity.

8.2 To demonstrate knowledge of fossils, students will:

(1) identify a definition of fossil;

(2) describe six ways that fossils may be formed; and

(3) define the terms key bed and index fossil.

8.3 To demonstrate knowledge of modern dating techniques and the time scale of geologic history, students will:

(1) explain what is meant by radioactive decay;

(2) define half-life; and

(3) name the four eras of geologic time, tell how long ago each ended, and identify the major life forms in each.

8.4 To demonstrate knowledge of fossil fuels, students will

(1) define fossil fuel;

(2) identify the three major sources of fossil fuels now in use and describe how each was formed;

(3) name the four forms of coal; and

(4) discuss the impact of a coal-fired power plant on land, water, and air.

KEY TO RECOMMENDED INSTRUCTIONAL MATERIALS

W. L. Ramsey, et al, Holt Earth Science (New York: Holt, Rinehart, and Winston, 1982).

Performance Objective		Instructional Implications		Resources	
Number	Topic	Teaching Time	Tested on	County Adopted	Supplementary
1.0	Earth Composition	4 weeks	MLST	pp. 17-18, 134-75, 194-98	"Notes to Teachers"
2.0	Earth Forces	4 weeks	MLST	pp. 19-55	"Notes to Teachers"
3.0	Weathering/ Erosion	3 weeks	MLST	pp. 58-64, 75-97, 184-92	"Notes to Teachers"
4.0	Atmosphere/ Weather	5 weeks	MLST	pp. 256-319	"Notes to Teachers"
5.0	The Oceans	3 weeks	MLST	pp. 330-77	"Notes to Teachers"
6.0	Water Resources	3 weeks	MLST	pp. 69-72, 200-04	Earth Science Resource Packet "Notes to Teachers"
7.0	Space	5 weeks	MLST	pp. 389-476	Earth Science Resource Packet "Notes to Teachers"
8.0	Earth History/ Fossil Fuels	3 weeks		pp. 104-27, 233-38	Earth Science Resource Packet "Notes to Teachers"

W. L. Ramsey, et al, *Holt Earth Science* (New York: Holt, Rinehart and Winston, 1982).

KEY TO LABORATORY RESOURCES

Objective	Skill	County Adopted Text Pages	Other Resources
	Students will:		
1.2.4	identify selected minerals by laboratory investigations.		W. L. Ramsey, et al, *Holt Earth Science Resource Book* (New York: Holt, Rinehart and Winston, 1982), p. 87.
1.4.3	analyze a sample of soil.		M. Schachter, et al, *Laboratory Program for Concepts and Challenges in Earth Science* (Fairfield, New Jersey: 1979), pp. 23-24.
2.1.4	demonstrate convection currents as a force for moving plates .		C. R. Coble, et al, *Earth Science: Laboratory/Activity Book* (Englewood Cliffs, New Jersey: Prentice-Hall, 1981), pp. 89-90.
2.2.4	plot location of earthquakes.	30-31	
2.2.5	determine the origin of earthquakes.	40-43	
2.3.4	plot the location of volcanoes.	38	
2.4.4	calculate density of object by displacement.	56	

ES9-20

KEY TO LABORATORY RESOURCES

Objective	Skill	County Adopted Text Pages	Other Resources
3.2.3	investigate chemical weathering.	187	
3.6.3	simulate windblown deposits.	91	
4.1.8	determine the percentage of oxygen in the atmosphere.		Coble, pp. 59-60.
4.2.6	demonstrate convection currents and temperature changes.	274	
4.2.7	demonstrate the cooling that results in evaporation.	283	
4.3.9	investigate temperature, dew point, and cloud altitude.	298	
5.1.4	construct a profile map of the ocean floor.	335-336	
6.1.4	construct a table of personal water use.		Earth Science 9, p. ES9-23.

KEY TO LABORATORY RESOURCES

Objective	Skill	County Adopted Text Pages	Other Resources
7.1.5	measure the earth's rotation by the movement of the stars.		Earth Science 9, p. ES9-25.
7.2.5	record observations of the moon.		Earth Science 9, p. ES9-28.
7.3.10	record observations of a planet.		Earth Science 9, p. ES9-32.

LABORATORY NUMBER 6.1.4

How Much Water Is Used In Your Home?

In an average day you use water in many different ways. In this activity, you will estimate the quantity of water you use in one day, find out what the experts calculate your actual use to be, and find out how you can conserve this resource.

Materials

Table of Personal Water Use
Pencil or pen

Procedure

1. Make an educated guess as to how much water is used in your home on an average day for each of the water uses listed in column (1).
2. Enter your estimate in column (2). Be certain to include the units you are estimating (i.e., ounces, pints, quarts, gallons, etc.).
3. If your family has other uses for water which are not listed. enter them in the blank spaces in column (1) and estimate use for them, too.
4. In class, your teacher will give you the figures which the experts calculate for the average family. Enter this information in column (3).
5. Make notes of ways you can conserve the water used for each of the uses in column (1). Write these notes in column (4). Your teacher will give you this information during class discussion.
6. Answer the questions below.

1. How did your estimates compare with the experts? ______________________

____

2. What is the total amount of water use in an average day in your home (sum of column 3)? ______________________.

3. How much would this be in a year? (365 days X sum) ______________________.

LABORATORY NUMBER 6.1.4

How Much Water Is Used In Your Home?

TABLE OF PERSONAL WATER USE

(1) USE	(2) ESTIMATE OF USE	(3) CORRECT AMOUNT	(4) HOW I CAN CONSERVE MORE
TUB BATHING			
SHOWER BATHING			
TEETH BRUSHING			
TOILET FLUSHING			
DISH WASHING			
CLOTHES WASHING			
ELECTRIC GARBAGE DISPOSING			
DRINKING			
LAWN WATERING			
CAR WASHING			

LABORATORY NUMBER 7.1.5

How Long Does It Take The Earth To Rotate?

A day, by definition, is the time it takes for the earth to complete one full rotation on its axis. As you stand on the earth's surface looking out into space, you too are being rotated about that axis. While you can't feel this motion, you can see its effects in the rising and setting of the stars. The time it takes for a star to return to the exact spot in the sky which it occupied the night before will give you the actual time it takes for the earth to complete one rotation. In this activity, you will determine the earth's rotation period.

Materials

meter stick (yard stick, wooden ruler, or other length of wood)

two straight pins (or headless nails)
accurate clock or wristwatch which shows minutes

Procedure

1. With the meter stick resting on its side, insert one pin into the top edge of the stick near the end. Insert the second pin halfway along the length of the stick. When finished, you should be able to sight along the stick as if it were a rifle, with the two pins forming a "sight" when lined up.

2. Find a place in your yard or in the house near a window where you can attach your meter stick sight. You may tack it to a piece of lawn furniture, a garage, the side of the house or indoors, tape it to a piece of furniture or window ledge. It is important that it not be jarred or moved once you have sighted a star with it.

3. Sight along the stick until you have lined up the two pins with some bright star which you feel you will be able to recognize the next night. As soon as you have a perfect line-up, record the time to the nearest minute.

4. The next night, return to your set-up about ten minutes before your first night's observation and sight along the stick. Wait for your star to move into view. If your stick has not been disturbed, the star should move into the same perfect line-up with the two pins, just as it did the night before.

5. The instant you see your star in line with the two pins, record the time to the nearest minute.

NOTE: Your observations will be easier to make if you choose a star in the east, south, or west and halfway up the sky.

LABORATORY NUMBER 7.1.5

How Long Does It Take The Earth To Rotate?

Student Laboratory Report

First Night

1. What time (to the nearest minute) did your star line up with your sighting stick the first night? ____________________

2. What time do you think it will line up tomorrow night?

   ____

Second Night

3. What time did the star line up again with your sighting stick?

   ____

4. Was your hypothesis in question 2 right or wrong? __________

5. What conclusion, if any, can you draw from the results of your two observations? ____________________

   ____

6. How long did it take the star to return to the position it was in the night before? _____ hours, ________ minutes. This should be the same time period it took for the earth to complete one rotation, or the length of one day.

Further study: Optional activities for interested students.

1. Repeat the investigation, but allow three days to pass between sightings. Divide the period by three and compare results with the original period.

2. Repeat the investigation using different stars. Are your results the same?

3. Repeat, using the moon instead of a star. Sight on the edge of the moon and watch for the same edge the next night. Are your results the same? Can you explain what is happening?

LABORATORY NUMBER 7.2.5

Recording Observations Of The Moon

The moon is the only natural satellite of the earth, and the only celestial body beyond the earth that has been visited by man. In this activity you will observe the appearance of the moon from the earth with the unaided eye, binoculars or a telescope.

Materials

student laboratory report
pencil
binoculars (if available)
telescope (if available)

Procedure

1. Consult the newspaper for the rising and setting times of the sun and moon. Select a night when the moon sets between one and three hours after the sun.
2. Locate the moon in the western sky on the night you have chosen. You can find it shortly after sunset not far from where the sun went down.
3. Make a sketch of the moon. Include a landscape feature if you wish. Your sketch should clearly show the shape of the moon's phase, and any surface shadings or details that you can make out. The line separating the sunlit part of the moon from the darkened part is called the terminator. Since shadows are longest in this region, it is a good place to look for surface features.
4. Examine the darkened part of the moon. It will probably be glowing with a faint, ghostly light. The light is called "earthshine" and is being reflected off the earth's daytime side. Add to your sketch any features you can make out in the earthshine.
5. Repeat the observations and activities in steps 3 and 4 on at least two more nights in the same week. Describe any changes you notice in the appearance of surface features, phase,or earthshine.
6. Observe the moon on an evening when the newspaper shows it rising at the same time the sun is setting. This should be near full moon. Compare this observation with your others, describing any changes you notice. You may try another sketch if you wish, but it is hard when the moon is so bright.

7. If you have access to a pair of binoculars, compare your naked-eye observations with the view you get through the binoculars. If you can locate any craters, describe their appearance. Examine the dark "seas" or maria for craters within them. Then inspect the brighter regions and the highlands, and describe their appearance. You may wish to describe one particular feature on the moon; for instance, a sea, to sketch each night instead of sketching the entire moon.

8. If you have access to a small telescope, compare your naked-eye observations with the view you get through the telescope. Examine the terminator carefully. Then inspect the dark "seas" and the brighter highlands and describe their appearance. You may wish to select one particular feature on the moon to sketch each night instead of sketching the entire moon.

LABORATORY NUMBER 7.2.5

Recording Observations Of The Moon

Student Laboratory Report

Sketch #1

Date__________________

Time Began_____________

Time Ended_____________

Notes:________________

Sketch #2

Date__________________

Time Began_____________

Time Ended_____________

Notes:________________

Sketch #3

Date ____________________

Time Began ______________

Time Ended ______________

Notes: __________________

____

____

____

____

____

____

Questions

1. What changes did you notice in the position of the terminator from night to night? ____

____

2. What changes did you notice in the appearance of the earthshine? _____

____

3. What did you notice about the position of the moon in the sky from night to night? ____

____

4. How would you compare the appearance of the full moon with how it looked the first three nights (especially with regard to surface features)?__

____

____

5. If you used binoculars, describe how the view of the moon through them differed from your naked-eye view (especially with regard to surface features). ____

____

LABORATORY NUMBER 7.3.10

Recording Observations Of A Planet

Of the nine planets in our solar system, five become bright enough to be seen in the evening sky with the unaided eye. Mercury, while bright enough for observation, never ventures far from the sun, and is a very difficult planet to locate. Venus, Mars, Jupiter and Saturn however, are easy planets - if you know where to look and for what to look. In this activity, you will observe at least one bright planet.

Materials

Student Laboratory Report
Pencil or pen
Binoculars or telescope, if you have access to the equipment

Procedure

1. Your teacher will provide you with the necessary information for locating a bright planet in the evening sky.

2. Locate the planet. You can usually confirm the identity of the body as a planet instead of a star by careful observation. Planets shine with a steady light, while stars twinkle rapidly; planets are usually brighter than the brightest star in the sky at the same time. If you carefully sketch the stars surrounding the object, and check a few days later, the stars will still hold the same positions but the planet will have moved slightly.

3. If you have use of your unaided eye only, refer to the outline sets A and B to chart the star field surrounding the planet. Make three or four sketches, three days apart. A comparison of your completed sketches should show the movement of the planet among the stars.

4. If you have access to binoculars, you can complete the sketches in procedure 3 by use of the stars you see in the binocular field of view These should be fainter and closer to the planet in the sky, so you can probably detect movement with drawings only a day or two apart. If you are observing Jupiter, and you can hold your binoculars very steady, you should be able to make out one or more of Jupiter's four Galilean satellites. The satellites' positions change nightly; sketch them.

5. If you are fortunate enough to have access to a telescope, use the outlines for the four bright planets. Sketch in any surface details you can make out on the planet or planets you observe. The disk for Jupiter is flattened at the poles like the planet. Saturn's rings change their orientation from year to year and may look somewhat different. Venus should show phases like the moon, and Mars exhibits polar caps and features. Jupiter's cloud belts are spectacular.

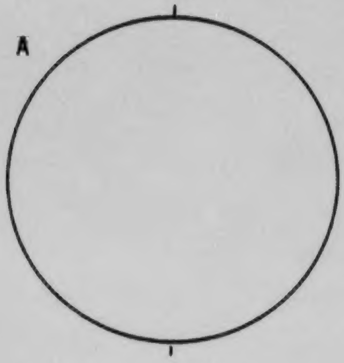
LABORATORY NUMBER 7.3.10

Recording Observations of a Planet

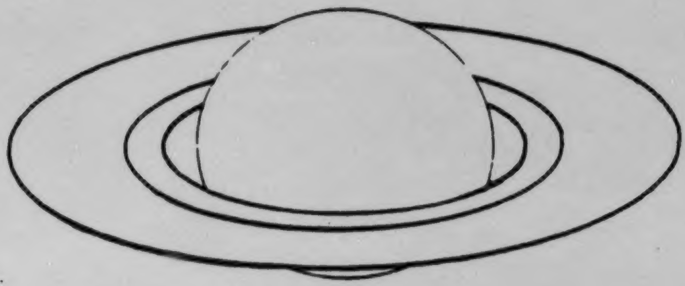
Student Laboratory Report

Use set A outlines for sketches of Venus or Mars, set B for sketches of Jupiter, and set C for sketches of Saturn. Be certain you record the date and time of each observation.

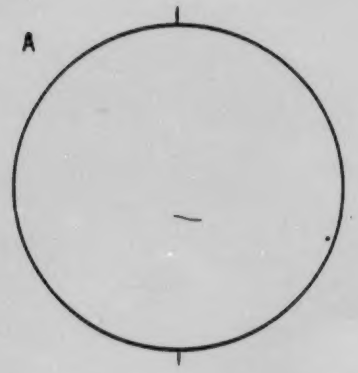
A



C



A



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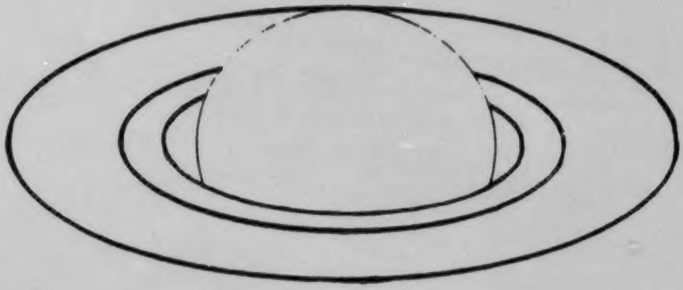

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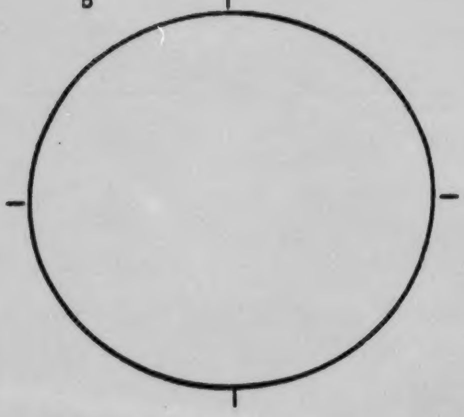

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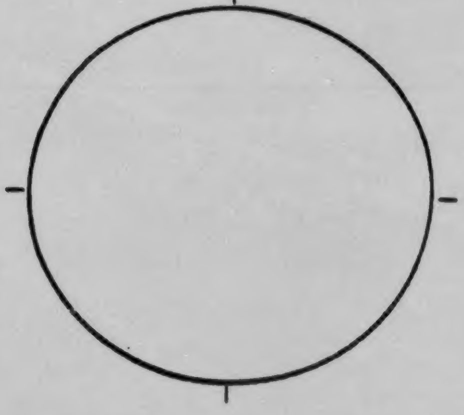

INTRODUCTION
LIFE SCIENCE 7

State Accreditator Number. . 1323
Course Code Number 2220
F.T.E. Category. 1.00
Instructional Level. . . . . Standard

Report Card Abbreviation . . Life Science 7
Length of Course . . . . . . 1 Semester
Credit . . . . 1/2 Science credit
Grade Level. 7

Prerequisites

None

Textbook(s)

Webster, V. et al, Life Science (Englewood Cliffs, New Jersey: Prentice-Hall, 1980).

Warriner, John E. et al, Warriner's English Grammar and Composition: Complete Course, Harcourt, 1977.

Notes to Teachers

Changes have been made in the content and format of the Course Outline and in the Performance Objectives for Life Science 7. Full objectives are now included in addition to the Minimum Level Skills objectives. Students are to develop laboratory skills as well as content knowledge.

The Minimum Level Skills (MLS) objectives are indicated with an asterisk (*) and will be the only objectives tested in the MLST The "Teaching time" listed on the "Key to Instructional Materials" is a suggested maximum time for each objective to help insure that all MLS objectives can be met by MLST time.

Laboratory skills are indicated with a plus sign (+). Suggested resources for teaching the laboratory skills have been listed at the end of this section of the teacher's guide. Other resources may be substituted for or added to suggested laboratory resources.

LIFE SCIENCE 7

1.0 Scientific Roles/ Terminology/ Methods

- *1.1 Introduction: Nature of Science/Biology
  - 1.1.1 Biology definition
  - 1.1.2 Role of biologist/ Researcher
- 1.2 Application of Scientific Method
  - *1.2.1 Problem/Hypothesis
  - *1.2.2 Experimentation
  - *1.2.3 Data/Variables
  - +1.2.4 Results/Conclusions

2.0 Scientific Tools

- *2.1 Identification: Laboratory/Field Apparata
- *2.2 Functions: Laboratory/ Field Apparata
- 2.3 Microscope Skills
  - +2.3.1 Microscope parts
  - +2.3.2 Microscope functions
  - +2.3.3 Proper handling/ care
  - +2.3.4 Viewing slides
  - *2.3.5 Magnification

3.0 Graphing

- *3.1 Reading Bar Graphs
- 3.2 Constructing Bar Graphs
- *3.3 Reading Line Graphs
- 3.4 Constructing Line Graphs
- *3.5 Reading Circle Graphs
- 3.6 Constructing Circle Graphs

4.0 The Cell

- 4.1 Cell Structure
  - *4.1.1 Basic unit of life
  - *4.1.2 Generalized cell parts
  - 4.1.3 Plant cell parts
  - +4.1.4 Plant/Animal cell differences
- *4.2 Free-living Cells
- *4.3 Levels of Life
- 4.4 Cell Division: Mitosis
  - 4.4.1 Mitotic phases
  - 4.4.2 Chromosome number
  - 4.4.3 Function

5.0 Diversity of Life

- *5.1 Characteristics: Living Organisms
- 5.2 Classification
  - 5.2.1 Taxonomy definition
  - 5.2.2 Grouping
  - 5.2.3 Binomial nomenclature
- 5.3 Protists
- 5.4 Plant Groups
  - 5.4.1 Lower plants
  - *5.4.2 Root functions
  - *5.4.3 Stem functions
  - *5.4.4 Leaf functions
  - *5.4.5 Behavior of carnivorous plants
  - *5.4.6 Cone-bearing plants
  - 5.4.7 Flowering plants
  - +5.4.8 Flower anatomy

* Indicates Minimum Level Skills
+ Indicates Laboratory Skills

LIFE SCIENCE 7

- 5.5 Animal Groups
  - *5.5.1 Insect groups
  - *5.5.2 Social insects
  - 5.5.3 Other invertebrate groups
  - +5.5.4 Earthworm anatomy
  - +5.5.5 Grasshopper anatomy
  - *5.5.6 Definition of vertebrate
  - 5.5.7 Fish/Amphibians/Reptiles/Birds
  - *5.5.8 Cold-blooded animals
  - *5.5.9 Mammals
  - *5.5.10 Man's classification
  - +5.5.11 Frog anatomy

6.0 Ecology / Pollution

- *6.1 Interrelationships
  - 6.1.1 Ecology definition
  - 6.1.2 Energy sources
  - 6.1.3 Producers
  - 6.1.4 Consumers
  - 6.1.5 Decomposition
- 6.2 Food Chains/Food Webs
  - *6.2.1 Food chain order
  - +6.2.2 Food webs
- 6.3 Threatened Species
- *6.4 Endangered Species
- *6.5 Extinct Species
- 6.6 Conservation
  - *6.6.1 Conservation definition
  - 6.6.2 Conservation methods
- 6.7 Pollution
  - *6.7.1 Pollution causes
  - 6.7.2 Pollution types
  - +6.7.3 Noise pollution

7.0 Genetics

- 7.1 Mendel's Laws
- 7.2 Genetic terms
- 7.3 DNA
  - 7.3.1 Chromosomes/Genes
  - 7.3.2 Structure: DNA
  - 7.3.3 Function: DNA
  - 7.3.4 DNA duplication
- 7.4 Hereditary Diseases

PERFORMANCE OBJECTIVES
LIFE SCIENCE 7

To demonstrate the ability to recall and apply knowledge of scientific roles, terminology and methods, scientific tools. reading graphs, the cell, diversity of life, ecology, and pollution, students will master the performance objectives listed below. Successful completion of this course is based on teacher judgement and the requirement that students pass the Minimum Level Skills Test.

Performance Objectives

1.0 Scientific Roles, Terminology, and Methods

*1.1 To demonstrate knowledge of the nature of science and biology, students will:

(1) identify a definition of biology; and

(2) explain that the role of the researcher is to verify results of other scientists' work.

1.2 To demonstrate knowledge of applying the scientific method as an approach to problem solving, students will:

*(1) identify the problem in a description of an experiment which follows the scientific method;

*(2) identify a proper definition of experimentation;

*(3) interpret data from a chart; and

+(4) graph results and make conclusions from variables.

2.0 Scientific Tools

*2.1 To demonstrate knowledge of laboratory and field apparata, students will identify from a composite diagram names for the following laboratory and field apparata: funnel, test tube, beaker, scissors, forceps, graduated cylinder, medicine dropper, flask, microscope, or thermometer.

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* Indicates Minimum Level Skills
+ Indicates Laboratory Skills

*2.2 To demonstrate knowledge of laboratory and field apparata, students will identify from a drawing the functions of the following laboratory and field apparata: funnel, test tube, beaker, scissors, forceps, graduated cylinder, medicine dropper, flask, microscope, or thermometer.

2.3 To demonstrate knowledge of the compound microscope, students will:

- +(1) identify the parts of a compound microscope;
- +(2) identify the functions of the compound microscope;
- +(3) explain the proper handling and care of the microscope;
- +(4) use the fine and coarse adjustment knobs on the microscope when viewing prepared slides; and
- *(5) identify magnification as the main function of the compound microscope.

3.0 Graphing

*3.1 To demonstrate knowledge of bar graphs, students will read data on a bar graph and compare separate things, persons, or events.

3.2 To demonstrate knowledge of bar graphs, students will construct graphs from data tables.

*3.3 To demonstrate knowledge of line graphs, students will interpret data on a line graph.

3.4 To demonstrate knowledge of line graphs, students will construct line graphs from data tables.

*3.5 To demonstrate knowledge of circle graphs, students will interpret a circle graph comparing parts to a whole.

3.6 To demonstrate knowledge of circle graphs, students will construct circle graphs from tables.

4.0 The Cell

4.1 To demonstrate knowledge of cell structure, students will:

*(1) identify the cell as the basic unit of life;

*(2) identify from a diagram the control center, cytoplasm, and cell membrane in a generalized cell;

(3) identify from a diagram the nucleus, cytoplasm, cell membrane, cell wall, and chloroplasts as the main parts of a typical plant cell; and

+(4) examine cheek cells and onion cells using the microscope and distinguish the nucleus, the cytoplasm, the cell membrane, or the cell wall.

*4.2 To demonstrate knowledge of a "free-living" cell, students will identify paramecium as an example of a free-living cell.

*4.3 To demonstrate knowledge of the levels of life, students will arrange the following levels of life in the correct order: cell, tissue, organ, system, and organism.

4.4 To demonstrate knowledge of cell division, students will:

(1) list and compare the five different phases of mitosis and explain what happens in each phase;

(2) compare the chromosomes in daughter cells which result from mitosis in the original cell; and

(3) state that the function of mitosis in organisms is for growth and repair.

5.0 Diversity of Life

*5.1 To demonstrate knowledge of the characteristics of living organisms, students will identify excretion, reproduction, ingestion, growth, and development as those characteristics.

5.2 To demonstrate knowledge of classification, students will:

(1) identify a definition of taxonomy;

(2) select the correct order for grouping organisms as: kingdom, phylum, class, order, family, genus, species; and

(3) identify binomial nomenclature as a system in which an organism is given a two-part Latin name.

5.3 To demonstrate knowledge of the protist kingdom, students will correctly classify organisms that are found in the kingdom Protista.

5.4 To demonstrate knowledge of the plant groups students will:

(1) identify examples of plant groups which have no conducting tissue;

*(2) identify the functions of the root as absorption of water and anchorage of the plant;

*(3) identify the functions of a stem as support, transport, and storage;

*(4) identify the main functions of leaf;

*(5) identify the Venus's flytrap as a plant that can trap insects;

*(6) identify pine or cypress as an example of a cone-bearing plant;

(7) identify flowering plants as the most advanced plant group; and

+(8) examine the parts of a flower and locate sepals, petals stamens and the pistil.

5.5 To demonstrate knowledge of the animal groups students will:

*(1) identify insects as the largest group of animals on earth;

*(2) identify bees, termites, wasps, or ants as social insects;

(3) list common names for coelenterates, roundworms, flatworms, annelids, mollusks, and arthropods;

+(4) dissect an earthworm observing both internal and external anatomy and locate organs of locomotion, digestion, and circulation;

+(5) dissect a grasshopper observing the external and internal anatomy and locate mouthparts, internal digestive organs, and reproductive structures;

*(6) identify an example of an animal with a backbone;

(7) list characteristics and examples of fish, amphibians, reptiles, and birds;

*(8) identify an example of a cold-blooded animal;

*(9) identify hair or fur as being characteristic of a mammal;

*(10) identify mammals as the group to which man belongs; and

+(11) dissect a frog and locate at least six structures involved in digestion, excretion, reproduction, circulation and movement.

6.0 Ecology and Pollution

*6.1 To demonstrate knowledge of ecology and pollution, students will:

(1) identify a definition of ecology;

(2) identify the sun as a source of heat and energy;

(3) identify a producer as an organism that can make its own food;

(4) identify an example of an organism that is a consumer; and

(5) distinguish between man-made pollution and the process of natural decomposition.

6.2 To demonstrate knowledge of food chains the students will:

*(1) identify the order in a food chain; and

+(2) establish and maintain an aquarium or a terrarium; and examine food chains and food webs.

6.3 To demonstrate knowledge of threatened species, students will identify a threatened species as one that is likely to become endangered.

*6.4 To demonstrate knowledge of endangered species, students will identify an endangered species as an organism that is likely to die out.

*6.5 To demonstrate knowledge of extinct organisms, students will identify an extinct organism as one that no longer exists.

6.6 To demonstrate knowledge of conservation, students will:

*(1) identify a general definition of conservation; and

(2) list as many methods of conserving natural resources and saving energy as possible.

6.7 To demonstrate knowledge of pollution, students will:

*(1) identify man and his activities as the main causes of pollution; and

(2) identify the main types of pollution as air, land, water, and noise pollution and give examples of each type; and

+(3) examine polluting sounds in the classroom and outside environments.

7.0 Genetics

7.1 To demonstrate knowledge of genetics, students will discuss Mendel's laws.

7.2 To demonstrate knowledge of genetic terms, students will define genotype, phenotype, heterozygous, homozygous, purebred dominance, recessive, hybrids, F_1, and F_2 generations.

7.3 To demonstrate knowledge of DNA, students will:

(1) define chromosomes and genes and give the functions of each;

(2) diagram the structure of DNA;

(3) explain how DNA functions in the cell; and

(4) explain how DNA duplicates itself.

7.4 To demonstrate knowledge of hereditary diseases, students will identify sickle cell anemia, Down's Syndrome, Tay Sach's, hemophilia, color blindness, and PKU as examples of hereditary diseases.

KEY TO RECOMMENDED INSTRUCTIONAL MATERIALS

Performance Objective		Instructional Implications		Resources	
Number	Topic	Teaching Time	Tested On	County Adopted Text	Supplementary
1.0	Scientific Roles, Terminology and Methods	1 week	MLST	V. Webster, et al, *Life Science* (Englewood Cliffs, New Jersey: Prentice-Hall, 1980), pp. 11-21.	P. F. Brandwein, et al, *Life: Its Forms and Changes* (New York: Harcourt, Brace and Jovanovich, 1972), pp. 509-12. C. Cornett, et al, *Reading Science Concepts and Skill Activities* (Portland, Maine: J. Weston Walch, 1977), pp. 50-65. *ISIS Resource Units* (Lexington, Mass: Ginn and Company, 1977), Unit 15. W. L. Ramsey, et al, *Holt Life Science* (New York: Holt, Rhinehart and Winston, 1978), pp. 1-9.
2.0	Scientific Tools	1 week	MLST	Webster, pp. 19-21.	Brandwein, pp. 535-38. *ISIS Resource Units*, Units 3, 5, 9, 10, 14. Ramsey, pp. 485-89.

KEY TO RECOMMENDED INSTRUCTIONAL MATERIALS

Performance Objective		Instructional Implications		Resources	
Number	Topic	Teaching Time	Tested On	County Adopted	Supplementary
					J. Richardson, et al, Life Science (Morristown, New Jersey: Silver Burdett, 1979), Excursions 1-4, pp. 498-511. Teacher-made: Student participation in demonstration of laboratory equipment.
3.0	Reading Graphs	1 week	MLST	Webster, pp. 133-43, 207-23.	Brandwein, pp. 69-95, 230-31. ISIS Resource Units, Units: 1, 2, 4, 19. W. L. Ramsey, et al, Holt Life Science Resource Book (New York: Holt, Rinehart and Winston, 1978), pp. 43-46.
4.0	Cells	2 weeks	MLST	Webster, pp. 133-43, 207-23.	Brandwein, pp. 69-95, 203-31, ISIS Resource Units, Unit 12. Ramsey, pp. 69-80. Richardson, pp. 19-31.

KEY TO RECOMMENDED INSTRUCTIONAL MATERIALS

Performance Objective		Instructional Implications		Resources	
Number	Topic	Teaching Time	Tested On	County Adopted	Supplementary
5.0	Diversity of Life	4 weeks	MLST	Webster, pp. 21-29, 36-40, 35-65, 41-44, 65-125, 128-32, 133-44.	Brandwein, pp. 224-29, 308-14, 219-24, 234-38, 239-42, 249-305, 314-421. Ramsey, Chapters 3, 4, 6. Richardson, Unit 2.
6.0	Ecology and Pollution	4 weeks	MLST	Webster, pp. 155-81, 333-49, 413-65, 453-67.	Brandwein, pp. 3-67, 516-37. Ramsey, Chapter 4. Richardson, Unit 3.
7.0	Heredity	2 weeks		Webster, pp. 382-406.	Brandwein, Chapters 17, 18. Ramsey, Chapter 11. Richardson, pp. 134, 475-86.

County Adopted Text:

V. Webster, et al, Life Science
(New York: Prentice-Hall, 1980)

*KEY TO LABORATORY RESOURCES

Objective	Skill	County Adopted Text Pages	Other Resources
	Students will:		
+1.2.4	graph results and make conclusions from variables.		ISIS Resource Units (Lexington, Mass: Ginn and Company, 1977), Unit 15. Junior High Science Laboratory Investigations (Duval County Public Schools, 1979-80), pp. 4-5. A. Kaskel, et al, A Learning Strategy for the Laboratory (Columbus, Ohio: Merrill Publishing Company, 1977), pp. 15-17, 31-32, 121-23, 151, 166-67. W. L. Ramsey, et al, Holt Life Science Resource Book (New York: Holt, Rinehart and Winston, 1978), pp. 43-46. V. Webster, et al, Life Science: Laboratory/Activity Book (New York: Prentice-Hall, 1980), pp. 7-8.
+2.3	identify parts, functions, proper handling/care and viewing slides with the compound microscope.		P. F. Brandwein, et al, Life: Its Forms and Changes (New York: Harcourt, Brace and Jovanovich, 1972), pp. 533-38.

KEY TO LABORATORY RESOURCES

Objective	Skill	County Adopted Text Pages	Other Resources
	Students will:		S. M. Eisler, et al, Lab-Inquiry Text: Life Science (New York: Cambridge Book Company, 1973), problems 1-1, 1-3. Kaskel, pp. 49-52. Webster, pp. 9-14.
+4.1.4	examine cheek and onion cells under the microscope and distinguish nucleus, cytoplasm, cell membrane, or cell wall.	213	Eisler, problem 1-5, 1-7. A. Kaskel, et al, Focus on Life Science/ Activity Centered Program Teachers' Guide (Columbus, Ohio: Merrill Publishing Company, 1977), pp. 57-58.
+5.4.8	examine the parts of a flower and locate the sepals, petals, stamens, and pistil.	373	Brandwein, p. 292. W. L. Ramsey, et al, Holt Life Science (New York: Holt, Rinehart and Winston, 1978), p. 323.
+5.5.4	dissect an earthworm observing external and internal anatomy and locate organs of locomotion, digestion, and circulation.		Brandwein, pp. 343-46. J. H. Otto, et al, Biology Investigations (New York: Holt, Rinehart and Winston, 1977), pp. 195-200.

KEY TO LABORATORY RESOURCES

Objective	Skill	County Adopted Text Pages	Other Resources
	Students will:		
+5.5.5	dissect a grasshopper observing the external and internal anatomy and locate mouthparts, internal digestive organs, and reproductive structures.		Brandwein, pp. 356-59. Otto, pp. 211-14.
+5.5.11	dissect a frog and locate at least six structures involved in digestion, excretion, reproduction, circulation, and movement.		Brandwein, pp. 97-101. Otto, pp. 235-40.
+6.6.2	establish and maintain an aquarium or a terrarium and examine food chain and food webs.	341	Eisler, problem 7-1, reference sheet 7-1, worksheet 7-2. Ramsey, Holt Life Science, pp. 381-84. Ramsey, Holt Resource Book, pp. 170-72. Richardson, pp. 384-85. Webster, pp. 77-78.
+6.11.3	examine polluting sounds in the classroom and outside environments.		Eisler, problem 8-4.

INTRODUCTION
LIFE SCIENCE 7, ADVANCED

State Accreditator Number. . 1323
Course Code Number 2222
F.T.E. Category. 1.00
Instructional Level. . . . . Advanced

Report Card Abbreviation . . Life Sci Adv.
Length of Course . . . . . . Semester
Credit . . . . 1/2 Science credit
Grade Level. 7

Prerequisites

Department Approval

Textbook(s)

Webster, V., et al, Life Science (Englewood Cliffs, New Jersey: Prentice-Hall, 1980).
Warriner, John E., et al, Warriner's English Grammar and Composition: Complete Course (New York: Harcourt, Brace, Jovanovich, 1977).

Notes to Teachers

The curriculum for Life Science 7, Advanced has been developed and designed to meet the needs of those students in seventh grade who are performing on an above-average level of competency in their academic subjects. Performance objectives and a course outline are provided as a guide in developing total student interest and mastery of the course content. Students are also expected to develop laboratory skills.

Minimum Level Skills objectives are indicated with an asterisk (*) and will be the only objectives tested on the MLST. The "Teaching Time" listed on the "Key to Instructional Materials" is a suggested maximum time for each objective to help ensure that all MLS objectives can be met by MLST time.

Laboratory skills are indicated with a plus (+) sign. Suggested resources for teaching the laboratory skills have been listed at the end of this section of the teacher's guide. Other resources may be substituted for or added to the suggested laboratory resources.

In addition to passing the Minimum Level Skills Test, each student is required to conduct library research on a life science topic (approved by the teacher), write a one-page summary of the findings, and make an oral presentation of the report to the class during the second nine-week grading period. The combined written and oral reports will count one-fourth of the second nine week's grade. The written report should be based on at least two sources and should follow criteria included in the school system's Language Arts Curriculum Guide (English 7, Advanced).

Except for Objective 1.5.1, specified laboratory investigations are included in the county adopted text or in the supplementary text, Life Science: Laboratory/Activity Book. The following instructions may be used for 1.5.1:

Germinating Seed Experiment

Equipment: Soaked corn seeds or bean seeds, petri dishes, paper towel, marking pen, metric ruler, tape.

Procedure:

1. Cut paper towels so they fit inside petri dish.
2. Dampen paper towels.
3. Place seed inside paper towel in center of petri dish and tape petri dish shut.
4. Place petri dish on end so roots and stem can grow.
5. When root is about 3 cm long, mark root and stem with marking pen every 5 mm and place back in petri dish. (Roots break easily.)
6. After 2 more days of growth observe marks on stem and root.

Results: Note that where the spaces have become further apart is where growth has taken place.

LIFE SCIENCE 7, ADVANCED

1.0 Introduction to Life Science

*1.1 Branches
1.1.1 Botany
1.1.2 Zoology
1.1.3 Microbiology
1.2 Scientific Method
1.2.1 Steps
*1.2.2 Hypothesis definition
1.2.3 Control group
*1.2.4 Graph interpretation
1.2.5 Graph construction
1.3 Tools/Field Apparata
*1.3.1 Microscope
*1.3.2 Identification: laboratory, field apparata
*1.3.3 Function: laboratory, field apparata
+1.3.4 Web mount preparation
+1.3.5 Microscope use
1.4 Classification
1.4.1 Taxonomy
*1.4.2 Order
1.4.3 Kingdoms
1.5 Living Organisms
1.5.1 Functions
+1.5.2 Seed germination
+1.5.3 Light response
+1.5.4 Metabolism product

2.0 Cell

*2.1 Definition
*2.2 Structure/Function
2.3 Plant/Animal
+2.4 Cheek/Onion Cell
2.5 Cell Reproduction
*2.5.1 Mitosis
*2.5.2 Meiosis
2.5.3 Chromosomes/Genes
2.5.4 Mitosis phases
*2.6 Life Levels
2.7 Protist Kingdom
2.7.1 Classification
*2.7.2 Identification
2.7.3 Paramecium
+2.7.4 Pond water

3.0 Plant Life Diversity

3.1 Non-vascular
+3.2 Mold Growth
3.3 Vascular
*3.3.1 Xylem
*3.3.2 Phloem
3.3.3 Examples
3.4 Vascular Seed Plants
3.4.1 Gymnosperm
3.4.2 Angiosperm
3.5 Plant Organs
*3.5.1 Leaf
*3.5.2 Stem
*3.5.3 Root
*3.5.4 Flower
+3.5.5 Flower structures
+3.5.6 Leaf classification
*3.6 Plant Needs
*3.7 Photosynthesis
+3.8 Relationship: Light/Oxygen Production

4.0 Life Continuity

*4.1 Reproductive Cells
4.1.1 Male
4.1.2 Female
*4.2 Reproduction Types
4.2.1 Asexual
4.2.2 Sexual/Zygotes

5.0 Animal Life Diversity

5.1 Skeletal Systems
5.1.1 Exoskeleton
5.1.2 Endoskeleton
5.1.3 Function

LIFE SCIENCE 7, ADVANCED

- 5.2 Invertebrate
  - 5.2.1 Definition
  - *5.2.2 Examples
  - +5.2.3 Earthworm
- 5.3 Coelenterata/Echinodermata
  - 5.3.1 Examples
  - 5.3.2 Characteristics
- 5.4 Arthropoda
  - 5.4.1 Phylum characteristics
  - 5.4.2 Classes
  - 5.4.3 Class characteristics
  - *5.4.4 Metamorphosis definition
- 5.5 Vertebrates
  - 5.5.1 Definition
  - *5.5.2 Examples
  - *5.5.3 Characteristics
- *5.6 Food Preferences

6.0 Ecology

- 6.1 Ecology
  - *6.1.1 Definition
  - 6.1.2 Population variances
- *6.2 Biosphere
- 6.3 Habitats
  - *6.3.1 Physical factors
  - 6.3.2 Life forms
  - 6.3.3 Biomes
- 6.4 Adaptation
  - 6.4.1 Definition
  - *6.4.2 Protection
  - 6.4.3 Animals
- *6.5 Community
- 6.6 Interaction
  - 6.6.1 Within species
  - *6.6.2 Predator/Prey
  - 6.6.3 Mutualism/Commensalism
  - +6.6.4 Ant colony
- *6.7 Food Chain
- 6.8 Carbon/Oxygen Cycle
- +6.9 Aquarium/Terrarium
- 6.10 Environmental Quality
  - 6.10.1 Pollution
  - *6.10.2 Conservation definition
  - 6.10.3 Conservation methods
  - +6.10.4 Algae: pollutants
  - +6.10.5 Matter recycling

7.0 Genetics

- 7.1 Mendel's Law
- 7.2 Terms
- 7.3 Genes
  - 7.3.1 Definition
  - 7.3.2 DNA
- 7.4 Genotype/Phenotype
  - 7.4.1 Genotype definition
  - 7.4.2 Phenotype definition
  - 7.4.3 Cross: genotype, phenotype

PERFORMANCE OBJECTIVES
LIFE SCIENCE 7, ADVANCED

To demonstrate the ability to apply knowledge of the scientific method, tools of the life scientist, classification, the cell, continuity of life, diversity of plant and animal life, ecology, genetics, and to conduct scientific investigations, students will master the performance objectives listed below. Successful completion of this course is based on teacher judgment and the requirement that students pass the Minimum Level Skills Test.

Performance Objectives

1.0 Introduction to Life Science

*1.1 To demonstrate knowledge of the branches of biology, students will:

(1) identify botany as the study of plant life;

(2) identify zoology as the study of animal life; and

(3) identify microbiology as the study of microscopic organisms.

1.2 To demonstrate the ability to apply the scientific method as an approach to problem solving, students will:

(1) identify the steps involved in scientific investigation (statement of problem, collecting data, forming hypothesis, experimentation, and reporting);

*(2) identify a definition of hypothesis;

(3) explain how a control group aids in scientific investigation;

*(4) interpret information from a pie, bar, and line graph; and

(5) construct a pie, bar, and line graph from data tables.

1.3 To demonstrate knowledge of the tools and field apparata of the life scientist, students will:

*(1) identify proper procedures for handling the microscope;

*(2) identify from a diagram names for the following laboratory and field apparata: graduated cylinder, balance, thermometer, hand lens, collecting bottle, collecting net, trowel, or sieve;

*(3) identify the functions of the following laboratory and field apparata: graduated cylinder, balance, thermometer, hand lens, collecting bottle, collecting net, trowel, or sieve;

+(4) demonstrate proper techniques for preparing a wet mount; and

+(5) demonstrate proper use of microscope when observing a wet mount.

1.4 To demonstrate knowledge of classification, students will:

(1) identify a definition of taxonomy;

*(2) identify the correct order for grouping organisms from the largest to the smallest (kingdom, phylum, class, order, family, genus, species); and

(3) identify that organisms are divided into three major kingdoms (plant, animal, protist).

1.5 To demonstrate knowledge of the characteristics of living organisms, students will:

(1) describe the basic functions of life carried on by all living organisms as growth, reproduction, responsiveness, and metabolism;

+(2) determine where growth takes place in a germinating seed;

+(3) demonstrate that plants respond to light when they bend towards the light source; and

+(4) demonstrate that starch is a product of plant metabolism.

2.0 Cell

*2.1 Students will identify the cell as the smallest part of a living thing that can carry on all life functions.

*2.2 Students will identify the structure and function of the cell wall, cell membrane, nucleus, cytoplasm, chromatin, mitochondrion, or chloroplasts when given a diagram of the cell.

2.3 Students will identify structural differences between plant and animal cells.

+2.4 Students will compare onion skin and cheek cells, using laboratory procedures.

2.5 To demonstrate knowledge of cell reproduction, students will:

*(1) identify the functions of mitosis as a method of growth and repair;

*(2) identify the functions of meiosis as a method of producing cells for reproduction;

(3) identify the location and function of chromosomes and genes; and

(4) list and compare the five phases of mitosis.

*2.6 Students will identify the proper order of the levels of life from smallest to largest (cell, tissue, organ, system, organism).

2.7 To demonstrate knowledge of the protist kingdom, students will:

(1) classify examples of protist organisms as bacteria, protozoans, slime molds, and viruses;

*(2) identify a paramecium, and amoeba, or euglena from a drawing;

(3) explain how the paramecium meets the basic needs of life; and

+(4) examine pond water for microscopic organisms.

3.0 Diversity of Plant Life

3.1 Students will identify examples of non-vascular plants as lichens, mosses, liverworts, algae and fungi.

+3.2 Students will demonstrate the effects of moisture and light on the growth of mold on food.

3.3 To demonstrate knowledge of vascular plants without seeds, students will:

*(1) identify xylem as conducting tubes which carry water and minerals from roots to leaves;

*(2) identify phloem as conducting tubes which carry food down the stem from leaves to roots; and

(3) identify club mosses and ferns as examples of vascular plants without seeds.

3.4 To demonstrate knowledge of vascular plants with seeds, students will:

(1) identify gymnosperms as cone-bearing plants which do not produce flowers; and

(2) identify angiosperms as those plants that produce flowers.

3.5 To demonstrate knowledge of plant organs, students will:

*(1) identify the major function of the leaf as photosynthesis;

*(2) identify the function of the stem as support for leaves and flowers;

*(3) identify the function of the root as anchorage and support;

*(4) identify the function of the flower as reproduction;

+(5) examine and identify the structures in a flower; and

+(6) classify leaves according to a simple or compound, vein pattern, and margin.

*3.6 Students will identify the basic needs of plants as food, water, minerals, and light.

*3.7 Students will identify the process of photosynthesis as the trapping of light energy to produce oxygen and simple sugars from carbon dioxide and water with chlorophyll as the catalyst.

+3.8 Students will perform an experiment showing the relationship between light and oxygen production in elodea plants.

4.0 Continuity of Life

*4.1 To demonstrate knowledge of the reproductive cells, students will:

(1) identify sperm as the male reproductive cell; and

(2) identify egg as the female reproductive cell.

*4.2 To demonstrate knowledge of the types of reproduction, students will:

(1) identify methods of asexual reproduction as fission, budding, spore formation, or vegetative propagation; and

(2) identify fertilization as the union of a sperm and an egg, and a zygote as a fertilized egg.

5.0 Diversity of Animal Life

5.1 To demonstrate knowledge of skeletal systems, students will:

(1) identify a definition of exoskeleton;

(2) identify a definition of endoskeleton; and

(3) identify the major functions of a skeletal system as support and protection.

5.2 To demonstrate knowledge of invertebrates, students will:

(1) identify an invertebrate as an organism without a backbone;

*(2) identify examples of organisms classified as invertebrates; and

+(3) determine by investigation the habits and physical characteristics of an earthworm.

5.3 To demonstrate knowledge of the invertebrate classes Coelenterata and Echinodermata, students will:

(1) give examples of organisms classified as Coelenterata and Echinodermata; and

(2) state two distinguishing characteristics of the Coelenterata and Echinodermata phyla.

5.4 To demonstrate knowledge of the phylum Arthropoda, students will:

(1) identify two common characteristics of all arthropods;

(2) identify the three major classes of the phylum Arthropoda as crustaceans, insects, and arachnids;

(3) describe distinguishing characteristics of the class crustaceans, insects, and arachnids; and

*(4) identify a definition of metamorphosis.

5.5 To demonstrate knowledge of vertebrates, students will:

(1) identify a definition of vertebrate;

*(2) identify examples of the five classes of vertebrates; and

*(3) identify distinguishing characteristics of the vertebrate classes amphibians and mammals.

*5.6 Students will identify the definition of herbivore, carnivore, scavenger, or omnivore.

6.0 Ecology

6.1 To demonstrate knowledge of ecology, students will:

*(1) identify a definition of ecology; and

(2) predict whether a population would tend to increase or decrease under a given circumstance.

*6.2 Students will identify the areas of the earth that are included in the biosphere.

6.3 To demonstrate knowledge of habitats, students will:

*(1) identify the five physical factors that affect land habitats as temperature, light, moisture, soil and oxygen;

(2) name forms of life that are peculiar to land, air, freshwater, and saltwater habitats; and

(3) discuss the physical characteristics and typical organisms of at least one land biome (tundra, coniferous forest, deciduous forest, grassland, or desert).

6.4 To demonstrate knowledge of adaptation, students will:

(1) identify a defintion of adaptation;

*(2) identify an example of protective adaptation as camouflage or mimicry; and

(3) discuss ways in which animals are adapted to living in their environment.

*6.5 Students will identify a community as all the organisms that live and interact in a particular area.

6.6 To demonstrate knowledge of the interaction among living things, students will:

(1) describe the interactions that are possible with members of the same species;

*(2) identify a description of a predator-prey relationship.

(3) compare examples of mutualism and commensalism; and

+(4) observe the interaction within an ant colony.

*6.7 Students will identify consumers, producers, and decomposers from a diagram of a food chain.

6.8 Students will explain the carbon and oxygen cycle which occurs between plants and animals.

+6.9 Students will establish a balanced aquarium or terrarium.

6.10 To demonstrate knowledge of environmental quality, students will:

(1) identify the major sources of air, water, land, and noise pollution;

*(2) identify conservation as the protection and preservation of the natural environment and its resources;

(3) describe methods of conserving natural resources;

+(4) observe by investigation the effect of pollutants on growth of algae; and

+(5) observe by investigation the recycling of matter in nature.

7.0 Genetics

7.1 Students will explain Mendel's Law.

7.2 Students will identify the definition of basic genetic terms (genetics, heterozygous, homozygous, purebred dominance, recessive, hybrids).

7.3 To demonstrate knowledge of genes, students will:

(1) identify the gene as the hereditary factor that determines the traits of an organism; and

(2) identify DNA as the chemical material of which genes are made.

7.4 To demonstrate knowledge of genotype and phenotype, students will:

(1) identify a definition of genotype;

(2) identify a definition of phenotype; and

(3) determine the genotype and phenotype of offspring, given the genotype of the parents.

KEY TO RECOMMENDED INSTRUCTIONAL MATERIALS

Performance Objective		Instructional Implications		Resources	
Number	Topic	Teaching Time	Tested on	County Adopted	Supplementary
1.0	Introduction to Life Science	2 weeks	MLST	V. Webster, et al, Life Science (Englewood Cliffs, New Jersey: Prentice-Hall, 1980), pp. 11-31, 495.	P. F. Brandwein, et al, Life: Its Forms and Changes (New York: Harcourt, Brace and Jovanovich, 1972), pp. 83, 535-38.
2.0	The Cell	3 weeks	MLST	Webster, pp. 206-20, 358-61, 127-149.	Brandwein, pp. 63-95, 230-31.
3.0	Diversity of Plant Life	3 weeks	MLST	Webster, pp. 34-65, 224-49, 314-31.	Brandwein, pp. 249-305, 224-29.
4.0	Continuity of Life	1 week	MLST	Webster, pp. 360-81.	
5.0	Diversity of Animal Life	2 weeks	MLST	Webster, pp. 66-125.	Brandwein, pp. 224-29, 314-421.
6.0	Ecology	3 weeks	MLST	Webster, pp. 154-78, 184-201, 332-51, 410-45, 450-67.	Brandwein, pp. 3-67, 516-32.

KEY TO RECOMMENDED INSTRUCTIONAL MATERIALS

Performance Objective		Instructional Implications		Resources	
Number	Topic	Teaching Time	Tested on	County Adopted	Supplementary
7.0	Genetic and Scientific Reporting	1 week		Webster, pp. 15-20, 383-405.	See "Notes to Teachers" *Junior High School Science* (Duval County Public Schools, 1981), p. LS, A-1.

County Adopted Text:

V. Webster, et al, Life Science
(New York: Prentice-Hall, 1980).

KEY TO LABORATORY RESOURCES

Objective	Skill	County Adopted Text Pages	Other Resources
	Students will:		
+1.3.4	demonstrate techniques for preparing wet mount.	495	
+1.3.5	correctly handle and use a microscope.	495	V. Webster, et al, Life Science: Laboratory/Activity Book (New York: Prentice-Hall, 1980), pp. 9-14.
+1.5.2	determine where growth in a germinating seed takes place.		See "Notes to Teachers," "Junior High School Science (Duval County Public Schools, 1981), p. LS,A-3.
+1.5.3	determine the effect of light on plant growth.	243	
+1.5.4	determine starch is a product of metabolism.	320	
+2.4	observe the difference between plant and animal cells.	213	
+2.7.4	observe microscopic organisms found in pond water.	137	

KEY TO LABORATORY RESOURCES

Objective	Skill	County Adopted Text Pages	Other Resources
	Students will:		
+3.2	test several variables that affect the growth of molds.	46	
+3.5.5	examine and identify structures in a flower.	373	
+3.5.6	compare the differences in leaf structures of different species.		Teacher-made
+3.8	determine oxygen production in elodea plants.	324	
+5.2.3	observe physical characteristics and behavior of an earthworm.	78	
+6.6.4	establish an ant colony.	193	
+6.9	establish a balanced aquarium or terrarium and observe the interaction between plants and animals.	341, 344	

KEY TO LABORATORY RESOURCES

Objective	Skill	County Adopted Text Pages	Other Resources
	Students will:		
+6.10.4	observe the effect of pollutants on algae growth.	464	
+6.10.5	observe the recycling of matter in nature.	458	

INTRODUCTION
PHYSICAL SCIENCE 8

State Accreditator Number. . 1348
Course Code Number 2520
F.T.E. Category. 1.00
Instructional Level. . . . . Standard

Report Card Abbreviation . . Phys Sci 8
Length of Course . . . . . . 1 Year
Credit . . . . 1 Science credit
Grade Level. 9

Prerequisites

None

Textbook(s)

Barman, Charles, et al, Physical Science (Morristown, New Jersey: Silver Burdett, 1979).

Heimler, Charles and Price, Jack, Focus on Physical Science (Columbus, Ohio: Charles E. Merrill, 1974).

Notes to Teachers

Changes have been made in the content and the format of the Course Outline and in the Performance Objectives for Physical Science 9. Full objectives are now included in addition to the Minimum Level Skills (MLS). Students are to develop laboratory skills as well as content knowledge.

The MLS objectives are indicated with an asterisk (*) and will be the only objectives tested on the Minimum Level Skills test (MLST). The "Teaching Time" listed on the "Key to Instructional Materials" is a suggested maximum for each objective to help insure that all MLS objectives can be met by MLST time. Objectives 7.0 and 8.0 are intended for use after the MLST.

Laboratory skills are indicated with a plus sign (+). Suggested resources for teaching the laboratory skills have been listed at the end of this section of the teacher's guide. Other resources may be substituted for or added to suggested laboratory resources. Supplementary materials listed in keys are in order of preferred use. Content for performance objective 1.0 is not completely covered in the county adopted text. Therefore, the "Energy Conservation Content Overview" may be obtained by calling the science office, 390-2129.

Laboratory Investigations

Objective: 3.3.3 Properties of elements.

Equipment: samples of copper, zinc, tin, carbon, sulfur, iron, calcium, lead, iodine, magnesium, and/or any other available element

Procedure:

1. Draw a data table having the following column headings: name of element, symbol, color, odor, state (solid, liquid, gas), important use.
2. Examine each element.
3. Fill in data table. Use a chemistry book or an encyclopedia to determine an important use.

Result: Characteristics of elements are noted.

Objective: 3.14.8 Physical properties of salts.

Equipment: small bottles of copper sulfate, sodium chloride, potassium dichromate, potassium permanganate, potassium chromate, and/or other salts of varying appearance as available.

Procedure:

1. Draw a data table having the following column headings: name of salt, formula, appearance.
2. Examine each bottle of salt.
3. Fill in data table.

Result: Characteristics of salts will be noted.

Objective: 3.14.5 Acids, bases, and salts.

Large numbers of dropping bottles are required for this exercise. The teacher will have to arrange to have students share 3 large sets of bottles. (Adaptation of exercise listed in "Key to Laboratory Resources.")

COURSE OUTLINE

PHYSICAL SCIENCE 8

- 1.0 Energy Conservation
  - 1.1 Energy Definition
  - * 1.2 Energy Sources
    - 1.2.1 Primary source
    - 1.2.2 Sources/Descriptions
  - 1.3 Source Advantages
    - * 1.3.1 Nuclear/Solar
    - 1.3.2 Geothermal/Wind/Water/Fossil fuels
  - 1.4 Source Disadvantages
    - * 1.4.1 Nuclear/Solar
    - 1.4.2 Geothermal/Wind/Water/Fossil fuels
  - * 1.5 Useful Products
  - 1.6 Energy Problem Factors
    - 1.6.1 Fossil fuels
    - 1.6.2 World demand
    - * 1.6.3 United States
  - * 1.7 Energy Problem Reasons
  - 1.8 Promising Florida Alternatives
  - 1.9 Government Agencies
    - 1.9.1 International
    - 1.9.2 National
    - * 1.9.3 State/Local
    - 1.9.4 Agency responsibilities
    - 1.9.5 Government actions
  - 1.10 Energy Conservation by Individuals
    - 1.10.1 Opportunity cost definition
    - * 1.10.2 Individual conservation measures
    - 1.10.3 Mass transportation
    - 1.10.4 Benefits versus opportunity costs
    - 1.10.5 Rising energy prices
  - 1.11 Balancing Energy Needs/Environmental Protection/Economy

- 2.0 Scientific Method/Data Management/Metrics/Laboratory Equipment/Procedures
  - 2.1 Scientific Method
    - * 2.1.1 Steps
    - 2.1.2 Step explanation
    - 2.1.3 Experiment structure
    - 2.1.4 Variable/Control
  - 2.2 Data Management
    - 2.2.1 Graph/Data table purpose
    - 2.2.2 Data table construction
    - * 2.2.3 Data table interpretation
    - 2.2.4 Line graph construction
    - * 2.2.5 Line graph interpretation
  - 2.3 Laboratory Equipment/Procedures
    - * 2.3.1 Basic measuring instruments
    - * 2.3.2 Reading meniscus
    - + 2.3.3 Reading thermometers
    - 2.3.4 Common laboratory equipment/Glassware
    - 2.3.5 Safety procedures
    - 2.3.6 Housekeeping procedures
  - 2.4 Metric System
    - * 2.4.1 Metric units
    - 2.4.2 Prefixes
    - + 2.4.3 Measure mass/Length/Volume

* Indicates Minimum Level Skills Test

+ Indicates Laboratory Skills

PHYSICAL SCIENCE 8

- 3.0 Matter: Structure/Form/Changes
  - *3.1 Matter Definition
  - 3.2 Matter Properties
    - +3.2.1 Characteristic properties classification
    - 3.2.2 Mass/Weight
    - 3.2.3 Volume/Impenetrability
    - 3.2.4 Density definition
    - 3.2.5 Density formula
    - +3.2.6 Density determination
    - 3.2.7 Specific gravity calculation
  - 3.3 Elements
    - 3.3.1 Definition
    - *3.3.2 Symbols
    - +3.3.3 Characteristic properties
  - 3.4 Compounds/Mixtures
    - *3.4.1 Formulas/Symbols
    - 3.4.2 Mixtures definition
    - 3.4.3 Compound composition
    - *3.4.4 Compound formulas
    - *3.4.5 Chemical formulas: elements, atoms
    - 3.4.6 Physical/Chemical changes
  - *3.5 States of Matter
    - 3.5.1 Identification
    - 3.5.2 Common substances
    - 3.5.3 Distance between atoms
  - *3.6 Atomic Theory
  - 3.7 Structure of the Atom
    - 3.7.1 Bohr's model
    - 3.7.2 Nucleus/Energy levels
    - *3.7.3 Particles/Location/Charge
    - 3.7.4 Isotopes
  - 3.8 Molecules
    - 3.8.1 Ionic/Covalent bonding
    - 3.8.2 Valence definition
    - 3.8.3 Binary compounds
    - 3.8.4 Polyatomic ions
  - *3.9 Metals/Non-metals
  - 3.10 Periodic Table
    - 3.10.1 Periodic Law
    - *3.10.2 Symbols/Atomic numbers/Atomic weights
    - 3.10.3 Groups/Periods
  - *3.11 Conservation of Mass
  - 3.12 Chemical Equations
    - 3.12.1 Reactants/Products
    - 3.12.2 Writing/Balancing
    - 3.12.3 Reaction types
  - 3.13 Solutions
    - 3.13.1 Solute/Solvent definition
    - 3.13.2 Solubility
    - 3.13.3 Concentrations
  - 3.14 Acids/Bases/Salts
    - 3.14.1 Acids: nature
    - 3.14.2 Bases: nature
    - 3.14.3 Acid/Base indicators
    - 3.14.4 Electrolytes
    - +3.14.5 Acids/Bases: properties, reactions
    - +3.14.6 Neutralization
    - 3.14.7 Salt definition
    - +3.14.8 Salt properties
    - 3.14.9 Salt names

PHYSICAL SCIENCE 8

- 4.0 Mechanics
  - 4.1 Force
    - *4.1.1 Definition
    - *4.1.2 Types
    - 4.1.3 Units
    - 4.1.4 Friction definition
    - 4.1.5 Friction/Force: relationship
    - 4.1.6 Force/Mass: relationship
  - 4.2 Work
    - *4.2.1 Description/Examples
    - 4.2.2 Formula
    - 4.2.3 Units
    - 4.2.4 Calculations
  - 4.3 Simple Machines
    - *4.3.1 Types
    - 4.3.2 Mechanical advantage
    - +4.3.3 Inclined plane
    - +4.3.4 Lever
    - +4.3.5 Pulley
    - 4.3.6 Efficiency formula
    - 4.3.7 Efficiency calculations
  - 4.4 Pendulums
    - 4.4.1 Description
    - 4.4.2 Period definition
    - 4.4.3 Mass/Period: relationship
    - 4.4.4 Length/Period: relationship
  - 4.5 Motion
    - 4.5.1 Newton's Laws
    - *4.5.2 Speed definition
    - *4.5.3 Acceleration definition
    - 4.5.4 Vector definition
    - 4.5.5 Momentum definition
  - 4.6 Kinetic/Potential Energy
    - 4.6.1 Potential energy definition
    - 4.6.2 Potential energy examples
    - 4.6.3 Kinetic energy definition
    - 4.6.4 Kinetic energy examples
    - 4.6.5 Kinetic/Potential energy: relationship
    - 4.6.6 Energy conservation law

- 5.0 Wave Properties/Sound/Light
  - 5.1 Sound Definition
  - *5.2 Vibrations/Sound Energy
  - 5.3 Waves
    - 5.3.1 Transverse/Compressional
    - *5.3.2 Components
    - 5.3.3 Component definitions
    - *5.3.4 Amplitude
    - 5.3.5 Pitch
    - 5.3.6 Doppler effect
  - 5.4 Sound Travel
    - 5.4.1 Medium
    - 5.4.2 Speed
  - 5.5 Interference: Constructive/Destructive
  - 5.6 Noise/Music
  - 5.7 Electromagnetic Spectrum
  - 5.8 Light Sources
    - 5.8.1 Luminous objects
    - 5.8.2 Illuminated objects
  - 5.9 Light Theories
    - 5.9.1 Particle
    - 5.9.2 Wave
  - 5.10 Light Travel
    - *5.10.1 Speed
    - 5.10.2 Media

PHYSICAL SCIENCE 8

- *5.11 Light Transmission in Matter
- *5.12 Reflection/Refraction
- 5.13 Mirrors
  - 5.13.1 Plane/Concave/Convex
  - 5.13.2 Law of Reflection
- 5.14 Lenses/Prisms
  - 5.14.1 Concave/Convex/Prisms
  - *5.14.2 White light/Prisms
- 5.15 Color
  - 5.15.1 Color vision
  - 5.15.2 Opaque objects
  - 5.15.3 Transparent objects
  - 5.15.4 Combinations

6.0 Electricity/Magnetism

- 6.1 Static Electricity
  - 6.1.1 Definition
  - 6.1.2 Cause
  - 6.1.3 Charge types
  - *6.1.4 Charge behavior
  - 6.1.5 Electroscope
  - 6.1.6 Van de Graaff generator
  - 6.1.7 Daily life examples
- 6.2 Current Electricity
  - *6.2.1 Definition
  - 6.2.2 Cause
  - 6.2.3 Current/Voltage/Resistance
  - *6.2.4 Circuit definition
  - 6.2.5 Simple circuit parts
  - 6.2.6 Circuit type comparison
  - +6.2.7 Circuit construction
  - *6.2.8 Conductors
  - 6.2.9 Insulators
  - 6.2.10 Wet cell/Dry cell
  - 6.2.11 Battery definition
  - 6.2.12 Electrical units
  - 6.2.13 Meter types
  - 6.2.14 Ohm's Law
  - 6.2.15 Current/Voltage/Resistance: relationship
- 6.3 Magnetism
  - 6.3.1 Electromagnet description
  - +6.3.2 Electromagnet construction
  - 6.3.3 Permanent magnet definition
  - *6.3.4 Magnetic properties
- 6.4 Producing/Using Electricity
  - 6.4.1 Electricity/Magnetism: relationship
  - 6.4.2 Direct/Alternating current
  - 6.4.3 Basic generator parts
  - 6.4.4 Electric generation
  - 6.4.5 Basic motor parts
  - 6.4.6 Motor operation

7.0 Heat

- 7.1 Kinetic Theory
  - 7.1.1 Theory
  - 7.1.2 Evaporation/Condensation
  - 7.1.3 Expansion/Contraction
  - 7.1.4 State change
- 7.2 Heat Definition
- 7.3 Temperature Definition
- 7.4 Absorption
- 7.5 Heat Transfer
- 7.6 Heat Measurement
  - 7.6.1 Units
  - 7.6.2 Calorie definition
  - 7.6.3 Calorimeter
  - 7.6.4 B.T.U. definition
- 7.7 Uses

PHYSICAL SCIENCE 8

8.0 Nucleonics

- 8.1 Radioactivity
  - 8.1.1 Definition
  - 8.1.2 Radiation types
  - 8.1.3 Natural decay
  - +8.1.4 Half-life
  - 8.1.5 Measuring instruments
  - 8.1.6 Uses
- 8.2 Nuclear Fission/Fusion
  - 8.2.1 Definitions
  - 8.2.2 Reactors

PERFORMANCE OBJECTIVES
PHYSICAL SCIENCE 8

To demonstrate ability to recall and apply knowledge of scientific method, data management, metrics, lab equipment and procedures, the structure, forms, and changes of matter, wave properties, sound, light, mechanics, electricity and magnetism, heat, and nucleonics, students will master the performance objectives listed below. Successful completion of this course is based on teacher judgement and the requirement that students pass the Minimum Level Skills Test.

Performance Objectives

1.0 Energy Conservation

1.1 To demonstrate knowledge of energy, students will define energy.

*1.2 To demonstrate knowledge of the energy sources, students will:

(1) identify the primary source of energy for the earth; and

(2) identify, from a description, the major sources of energy as solar, geothermal, nuclear, wind and water, or fossil fuel.

1.3 To demonstrate knowledge of the advantages of the energy sources, students will:

*(1) identify an advantage of solar or nuclear energy; and

(2) state advantages of geothermal, wind and water, and fossil fuels.

1.4 To demonstrate knowledge of the disadvantages of the energy sources, students will:

*(1) identify a disadvantage of solar or nuclear energy; and

(2) state disadvantages of geothermal, wind and water, and fossil fuels.

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* Indicates Minimum Level Skills
+ Indicates Laboratory Skills

*1.5 To demonstrate knowledge of the useful products of the energy sources, students will identify the useful products as heat, light, motion, or current electricity.

1.6 To demonstrate knowledge of the factors leading to the energy problem, students will:

(1) state that fossil fuels are a non-renewable resource;

(2) state that world demand is increasing; and

*(3) identify the United States as using more fossil fuel than it produces.

*1.7 To demonstrate knowledge of the overall reasons for the energy problem, students will identify these reasons as waste, standards of living, or attitudes relating to available energy supplies.

1.8 To demonstrate knowledge of promising alternatives to fossil fuel for Florida, students will identify solar and nuclear energy and defend their choices.

1.9 To demonstrate knowledge of government agencies attempting to help deal with the energy problem, students will:

(1) identify the international agency as the International Energy Agency (IEA);

(2) identify the national agencies as the Department of Energy (DOE) and the Environmental Protection Agency (EPA);

*(3) identify the state and local agencies as the State Energy Office (SEO) and the JEA Energy Office;

(4) match each of the agencies with its major responsibility; and

(5) list specific actions taken by the government in the area of energy management.

1.10 To demonstrate knowledge of energy conservation as it relates to the individual, students will:

(1) define opportunity cost;

- *(2) identify an individual action that would conserve energy;

(3) give examples of types of mass transportation systems in operation, in experimental stages, under consideration in various countries and the United States;

(4) describe the benefits and opportunity costs of a number of individual conservation measures; and

(5) list reasons for the rising cost of energy.

1.11 To demonstrate knowledge of a need for balance, students will describe ways in which our energy needs, environment, and economy may have various effects upon each other.

2.0 Scientific Method/Data Management/Metrics/Laboratory Equipment/Laboratory Procedures

2.1 To demonstrate knowledge of the scientific method, students will:

*(1) identify, in order, the steps in the scientific method as: problem, hypothesis, experimentation, collection of data, and conclusion;

(2) explain each step of the scientific method;

(3) design an experiment; and

(4) identify the variables and controls in an experiment.

2.2 To demonstrate knowledge of data management, students will:

(1) state the purposes of using data tables and graphs;

(2) construct a data table from a given data collection;

*(3) interpret data given on a table;

(4) construct a line graph; and

*(5) interpret relationships between two variables on a line graph.

2.3 To demonstrate knowledge of laboratory equipment and procedures, students will:

*(1) identify the appropriate use for measuring with a meter stick, graduated cylinder, balance, or thermometer;

*(2) determine the amount of water in a graduated cylinder from a diagram;

+(3) read Celsius and Fahrenheit thermometers;

(4) identify common laboratory equipment and glassware;

(5) list safety procedures for functioning in a laboratory; and

(6) list procedures for obtaining and returning equipment, laboratory clean-up, and other housekeeping chores specific to the individual classroom.

2.4 To demonstrate knowledge of the metric system, students will:

*(1) identify the metric units which measure length, time, volume, or mass;

(2) match metric prefixes with their numerical values;

+(3) measure mass, length, and volume;

3.0 Matter: Its Structure Form, and Changes

*3.1 To demonstrate knowledge of the nature of matter, students will identify a definition of matter as anything that has mass and takes up space.

3.2 To demonstrate knowledge of the characteristic properties of matter, students will:

+(1) classify characteristic properties of matter;

(2) distinguish between mass and weight;

(3) explain volume and impenetrability;

(4) define density;

(5) identify the formula for determining density;

+(6) determine density; and

(7) calculate specific gravity.

3.3 To demonstrate knowledge of elements, students will:

(1) define element;

*(2) identify symbols of common elements as carbon, hydrogen, oxygen, nitrogen, copper, iron, or aluminum; and

+(3) determine some characteristic properties.

3.4 To demonstrate knowledge of compounds and mixtures, students will:

*(1) identify which substance is a compound when given a list with chemical formulas and symbols;

(2) identify a definition of a mixture;

(3) identify the kinds of elements present in a compound;

*(4) identify formulas of common compounds as table salt, water, or carbon dioxide;

*(5) specify the number of elements or the number of atoms of each element when given a chemical formula;

(6) classify properties as physical or chemical; and

*(7) classify changes as physical or chemical.

*3.5 To demonstrate knowledge of the states of matter, students will:

(1) identify the three states of matter as solid, liquid,and gas;

(2) specify the natural states of common examples of matter as alcohol, water, oxygen, iron, or lead and;

(3) compare the distance between atoms in the three states of matter.

*3.6 To demonstrate knowledge of the atom, students will identify the atom as the basic building block of matter.

3.7 To demonstrate knowledge of the structure of the atom, students will:

(1) draw diagrams of atoms using the Bohr model;

(2) point out on a diagram or model the nucleus and the energy levels of an atom;

*(3) identify the particles in an atom, their location, or charge; and

(4) draw models of selected isotopes.

3.8 To demonstrate knowledge of characteristics and behavior of molecules, students will:

(1) diagram examples of ionic and covalent bonding;

(2) define valence as the combining capacity of an atom or group of atoms;

(3) write the formulas and names for binary compounds; and

(4) write the formulas and names for compounds containing polyatomic ions.

*3.9 To demonstrate knowledge of metals and non-metals, students will identify a common element as a metal or non-metal.

3.10 To demonstrate knowledge of the Periodic Table of the Elements, students will:

(1) identify the periodic law;

*(2) identify from a sample block of the Periodic Table, the atomic information, symbol, atomic number, or atomic weight; and

(3) locate on a Periodic Table, the groups and period of the elements.

*3.11 To demonstrate knowledge of the conservation of mass, students will apply the law to specify that the total mass does not change in a chemical reaction.

3.12 To demonstrate knowledge of chemical equations, students will:

(1) identify the reactants and products in an equation;

(2) write and balance simple equations; and

(3) identify different types of chemical reactions as double replacement, single replacement, decomposition, and synthesis.

3.13 To demonstrate knowledge of solutions, students will:

(1) identify the definition for solute and solvent;

+(2) determine how heating a solution affects solubility; and

(3) compare saturated and supersaturated solutions.

3.14 To demonstrate knowledge of acids, bases, and salts, students will:

(1) describe the characteristics of acids in terms of concentration of hydronium ions;

(2) describe the characteristics of bases in terms of concentration of hydroxide ions;

(3) define an acid/base indicator;

(4) explain the action of an electrolyte on the basis of current electricity and a complete circuit;

+(5) determine which of several common materials are acidic, basic, and neutral;

+(6) investigate the neutralization of an acid;

(7) identify the definition of a salt;

+(8) determine the physical properties of salts; and

(9) write the name of several salts based on the acid and the base from which they are formed.

4.0 Mechanics

4.1 To demonstrate knowledge of force, students will:

*(1) identify a general definition of force;

*(2) identify types of force from examples as gravity, electrostatic, nuclear, or magnetic;

(3) identify force units;

(4) define friction;

(5) describe the relationship between friction and force; and

(6) describe the relationship between force and mass.

4.2 To demonstrate knowledge of work, students will:

*(1) identify, from examples, a situation which describes work being done;

(2) identify the formula for calculating work;

(3) identify work units; and

(4) calculate work.

4.3 To demonstrate knowledge of simple machines, students will:

*(1) identify examples of simple machines as a pulley, a lever, an inclined plane, or a wheel and axle;

(2) define mechanical advantage as the number of times a machine multiplies the input force;

+(3) compare the force needed to lift an object with the force needed to move the object up a ramp;

+(4) determine the relationship between force and distance on a first class lever;

+(5) observe the operation of a pulley system;

(6) identify the formula for calculating efficiency; and

(7) calculate efficiency.

4.4 To demonstrate knowledge of pendulums, students will:

(1) describe a pendulum;

(2) define period;

(3) explain the relationship between the mass of a pendulum and its period; and

(4) explain the relationship between the length of a pendulum and its period.

4.5 To demonstrate knowledge of motion, students will:

(1) state Newton's laws;

*(2) identify a description of speed;

*(3) identify a description of acceleration;

(4) define vector; and

(5) define momentum.

4.6 To demonstrate knowledge of kinetic and potential energy, students will:

(1) define potential energy;

(2) give examples of potential energy;

(3) define kinetic energy;

(4) give examples of kinetic energy;

(5) explain the relationship between kinetic and potential energy; and

(6) state the law of energy conservation.

5.0 Wave Properties, Sound, and Light

5.1 To demonstrate knowledge of the nature of sound, students will identify a definition of sound.

*5.2 To demonstrate knowledge of sound energy, the students will identify sound energy as energy produced when matter vibrates.

5.3 To demonstrate knowledge of wave properties, students will:

(1) identify a description and/or model of transverse and compressional waves;

*(2) identify a wave component on a diagram as wavelength, amplitude, frequency, crest, or trough;

(3) define the components of a wave: wavelength, amplitude, frequency, crest, or trough;

*(4) identify, from examples, the type of sound producing the greatest amplitude;

(5) identify the relationship between pitch and frequency; and

(6) identify examples of the Doppler effect.

5.4 To demonstrate knowledge of how sound travels, students will:

(1) state that sound must have a medium in which to travel; and

(2) identify the quantity that represents the speed of sound.

5.5 To demonstrate knowledge of wave interference, the student will identify, from illustrations or descriptions, constructive and destructive interference.

5.6 To demonstrate knowledge of noise and music, students will distinguish between the wave patterns of noise and music.

5.7 To demonstrate knowledge of the electromagnetic spectrum, students will identify the kinds of waves and how they are similar to and different from each other.

5.8 To demonstrate knowledge of light sources, students will:

(1) list examples of luminous objects; and

(2) list examples of illuminated objects.

5.9 To demonstrate knowledge of the theories of light, students will:

(1) identify a description of the particle theory; and

(2) identify a description of the wave theory.

5.10 To demonstrate knowledge of the way in which light travels, students will:

*(1) identify, from examples, that nothing is known to travel faster than the speed of light; and

(2) state that light may travel in various media and in a vacuum.

*5.11 To demonstrate knowledge of the effects of light transmission in materials, students will identify, from examples, whether a material is transparent, translucent, or opaque.

*5.12 To demonstrate knowledge of reflection and refraction, students will identify reflection or refraction when given an example.

5.13 To demonstrate knowledge of the uses of mirrors, and the law of reflection, students will:

(1) identify a definition of a plane mirror, a concave mirror, and a convex mirror; and

(2) relate the law of reflection to smooth surfaces and to rough surfaces.

5.14 To demonstrate knowledge of lenses and prisms, students will:

(1) identify from illustrations or models, examples of concave lenses, convex lenses, and prisms; and

*(2) identify the result of passing white light through a prism as breaking the light up into the colors of the rainbow.

5.15 To demonstrate knowledge of color vision and the reflective-absorptive properties of matter, students will:

(1) identify the cones in the eye as structures responsible for color vision;

(2) state the laws of color for opaque objects;

(3) identify colored transparent materials as acting like a filter by absorbing six colors and transmitting only one; and

(4) identify the result of the combination of primary colors and primary pigments.

6.0 Electricity and Magnetism

6.1 To demonstrate knowledge of static electricity, students will:

(1) define static electricity;

(2) describe the means by which objects become charged;

(3) name the types of charges;

*(4) identify the behavior of positively and negatively charged objects as repelling each other when alike and attracting each other when unlike;

(5) identify the electroscope as an instrument for detecting a static charge;

(6) identify the function of a Van de Graaff generator; and

(7) give examples of static electricity in daily life situations.

6.2 To demonstrate knowledge of current electricity, students will:

*(1) identify a definition of an electric current;

(2) explain the cause of current flow;

(3) distinguish between current, voltage, and resistance;

*(4) identify a definition of a circuit;

(5) list the parts of a simple circuit;

(6) compare series and parallel circuits;

+(7) construct series and parallel circuits;

*(8) identify examples of materials which are good conductors of electricity as metals or graphite;

(9) give examples of materials which are good insulators;

(10) describe a wet cell and a dry cell;

(11) define battery;

(12) identify the appropriate use for the electrical units amp, volt, and ohm;

(13) identify the meter used to measure current, voltage, and resistance;

(14) state Ohm's law as V = IR; and

(15) identify the relationship between current and resistance when voltage is held constant.

6.3 To demonstrate knowledge of magnetism, students will:

(1) describe an electromagnet;

+(2) construct an electromagnet;

(3) define permanent magnet; and

*(4) identify as properties of magnets that they attract iron, and that like poles repel and unlike poles attract.

6.4 To demonstrate knowledge of producing and using electricity, students will:

(1) describe the relationship between electricity and magnetism;

(2) describe direct and alternating current;

(3) identify the basic parts of an electric generator;

(4) explain the principle of electric generation;

(5) identify the basic parts of an electric motor; and

(6) explain the principle of motor operation.

7.0 Heat

7.1 To demonstrate knowledge of the Kinetic Theory of Matter, students will:

(1) state the theory;

(2) state the relationship of the theory to an explanation of evaporation and condensation;

(3) state the relationship of the theory to an explanation of expansion and contraction; and

(4) state the relationship of the theory to an explanation of change of state.

7.2 To demonstrate knowledge of heat, students will define heat.

7.3 To demonstrate knowledge of temperature, students will define temperature.

7.4 To demonstrate knowledge of absorption, students will compare the abilities of different materials to absorb heat.

7.5 To demonstrate knowledge of heat transfer, students will describe the means by which heat may be transferred.

7.6 To demonstrate knowledge of heat measurement, students will:

(1) name the units for measuring heat;

(2) define calorie;

(3) identify the calorimeter as an instrument for measuring heat; and

(4) define B.T.U.

7.7 To demonstrate knowledge of the uses of heat, students will list uses of heat.

8.0 Nucleonics

8.1 To demonstrate knowledge of the nature of the atomic nucleus and radioactivity, students will:

(1) identify a definition for radioactivity;

(2) list the types of nuclear radiation;

(3) describe the radioactive decay of elements into other elements;

+(4) demonstrate the principle of half-life;

(5) identify examples of instruments used to measure radiation; and

(6) list some uses for radioisotopes.

8.2 To demonstrate knowledge of nuclear fission and fusion as a source of energy, students will:

(1) define nuclear fission and fusion; and

(2) list some uses for nuclear reactors.

KEY TO RECOMMENDED INSTRUCTIONAL MATERIALS

Performance Objective		Instructional Implications		Resources	
Number	Topic	Teaching Time	Tested On	County Adopted	Supplementary
1.0	Energy Conservation	4 weeks	MLST	C. Barman, et al, Physical Science (Morristown, New Jersey: Silver Burdett, 1979), pp. 291-375.	"Energy Conservation Content Overview" (Duval County Public Schools, 1979). Available from Science and Environmental Studies Office, 390-2129. Duval Consumer Education Curriculum, "Energy: Economic and Environmental Effects" (Duval County Public Schools, 1980). Available through your school media center or by calling the Department of Economics, University of North Florida, 646-2776. Energy Conservation and Education in the Duval County School System (Duval County Public Schools, 1979), pp. 18-74. For additional help contact the following agencies: 1) Jacksonville Electric Authority Energy Office 233 W. Duval Street Jacksonville, Florida 32202, 633-6123

KEY TO RECOMMENDED INSTRUCTIONAL MATERIALS

Performance Objective		Instructional Implications		Resources	
Number	Topic	Teaching Time	Tested On	County Adopted	Supplementary
					2) State Energy Office 108 Collins Building Tallahassee, Florida 32304, 1-488-0855 3) U.S. Department of Energy Washington, D. C. 20545 4) Cooperative Extension Service Energy Information Center 1010 McDuff Avenue Jacksonville, Florida 32205, 384-2001 "The Great Electric Power Puzzle" (Film), Produced by WJCT TV, Channel 7, film and game available through Channel 7, or film available through Duval County Public Schools media center.

KEY TO RECOMMENDED INSTRUCTIONAL MATERIALS

Performance Objective		Instructional Implications		Resources	
Number	Topic	Teaching Time	Tested On	County Adopted	Supplementary
2.0	Scientific Method, Data Management, Metrics, Laboratory Equipment and Procedures	4 weeks	MLST	Barman, pp. 3-11, 25-39, 378-95, T 10-T 11.	C. Heimler and J. Price, Focus on Physical Science (Columbus, Ohio: Charles E. Merrill, 1974), pp. 4-21. ISIS Resource Units (Lexington, Mass: Ginn and Company, 1977), Units 2, 4, 5, 9, 10, 13, 14, 15, 19. Universe and I (Video Tapes), "I and the Universe " (ITV Department, Duval County Public Schools).
3.0	Matter: Structure, Form, and Changes	9 weeks	MLST	Barman, pp. 3-22, 40-41, 49-80, 83-97, 105-16, 127-50, 153-76.	J. Oxenhorn, Pathways in Science Chemistry I (New York: Globe Book Company, 1975), pp. 5-86, 102-10, 117-21, 141-77. J. Oxenhorn, Pathways in Chemistry 2 (New York: Globe Book Company, 1975), pp. 3-6, 96-106.

KEY TO RECOMMENDED INSTRUCTIONAL MATERIALS

Performance Objective		Instructional Implications		Resources	
Number	Topic	Teaching Time	Tested On	County Adopted	Supplementary
4.0	Mechanics	4 weeks	MLST	Barman, pp. 199-237.	J. Oxenhorn, Pathways in Science Chemistry 3 (New York: Globe Book Company, 1975), pp. 1-10, 26-63, 80-95. ISIS Resource Units, Unit 18, 22, 24. Universe and I, "Halftime." Heimler and Price, pp. 220-37, 244-57, 264-84, 293-94. J. Oxenhorn, Pathways in Science Physics 2 (New York: Globe Book Company, 1975), pp. 41-114. ISIS Resource Units, Unit 18. Universe and I, "Vectoria," "Luna the Lovely," "The Future," "Gravity Drag," and "Bulletin."

KEY TO RECOMMENDED INSTRUCTIONAL MATERIALS

Performance Objective		Instructional Implications		Resources	
Number	Topic	Teaching Time	Tested On	County Adopted	Supplementary
5.0	Wave Properties, Sound and Light	5 weeks	MLST	Barman, pp. 273-83.	Heimler and Price, pp. 331-46, 352-67. J. Oxenhorn, Pathways in Science Physics 3 (New York: Globe Book Company, 1975), pp. 1-33, 47-60, 87-101, 111-53. Universe and I, "A Visit to Spectrum II."
6.0	Electricity and Magnetism	4 weeks	MLST	Barman, pp. 239-55.	Heimler and Price, pp. 374-93. J. Oxenhorn, Pathways in Science Physics 1 (New York: Globe Book Company, 1975), pp. 5-48, 60-84, 90-100. W. Herron, et al, Matter, Life, and Energy (Chicago: Illinois: Rand McNally, 1972), pp. 281-99.

KEY TO RECOMMENDED INSTRUCTIONAL MATERIALS

Performance Objective		Instructional Implications		Resources	
Number	Topic	Teaching Time	Tested On	County Adopted	Supplementary
7.0	Heat			Barman, pp. 66-80, 257-71, 393-95.	Heimler and Price, pp. 293-323. Oxenhorn, Pathways in Science Physics 1, pp. 123-57. ISIS Resource Units, Unit 14.
8.0	Nucleonics			Barman, pp. 179-91.	Heimler and Price, pp. 421-28, 445-51.

County Adopted Text:

C. Barman, et al, Physical Science
(Morristown, New Jersey: Silver
Burdett, 1979).

KEY TO LABORATORY RESOURCES

Objective	Skill	County Adopted Text Pages	Other Resources
	Students will:		
+2.3.3	take readings with thermometer.	393-95	ISIS Resource Units (Lexington, Mass: Ginn and Company, 1977), Unit 14.
+2.4.3	measure mass, length, and volume.	378-92	C. Heimler and J. Price, Focus On Physical Science (Columbus, Ohio: Charles E. Merrill, 1974), pp. 11-14.
+3.2.1	classify characteristic properties of matter.	14	Heimler and Price, p. 25. V. Como, Physical Science: A Learning Strategy for the Laboratory (Columbus, Ohio: Charles E. Merrill, 1974), pp. 97-99.
+3.2.6	determine density.		E. Perkins and R. McNemar, Physical Science Skillcards (Columbus, Ohio: Charles E. Merrill, 1969), Skillcard 44. Heimler and Price, p. 18.

KEY TO LABORATORY RESOURCES

Objective	Skill	County Adopted Text Pages	Other Resources
	Students will:		
+3.3.3	determine some characteristic properties of elements.		See "Notes to Teachers," Junior High School Science (Duval County Public Schools, 1980), p. PS 2.
+3.13.2	determine how heating a solution affects solubility.	92-93	Como, pp. 105-07.
+3.14.5	determine which of several solutions are acidic, basic, or neutral.	166-67	See "Notes to Teachers," Junior High School Science (Duval County Public Schools, 1980), p. PS 2. Heimler and Price, p. 200.
+3.14.6	investigate the neutralization of an acid.	169	Heimler and Price, p. 208. Como, pp. 109-11.
+3.14.8	determine physical properties of salts.		See "Notes to Teachers," Junior High School Science (Duval County Public Schools, 1980), p. PS 2.
+4.3.3	compare the force needed to lift an object with the force needed to move the object up a ramp.	206	Heimler and Price, p. 232.

KEY TO LABORATORY RESOURCES

Objective	Skill	County Adopted Text Pages	Other Resources
	Students will:		
+4.3.4	determine the relationship between force and distance on a first class lever.	209	Heimler and Price, p. 227. Como, pp. 41-47, 53-54.
+4.3.5	observe the operation of a pulley system.	211	Heimler and Price, p. 230.
+6.2.7	construct series and parallel circuits.	240	J. Oxenhorn, Pathways In Science Physics I (New York: Globe Book Company, 1975), pp. 18-26.
+6.3.2	construct an electromagnet.	245	Como, pp. 163-64. Heimler and Price, p. 383.
+8.1.4	demonstrate the principle of half-life.	183	